SPECIFICATIONS

WYOMISSING LIGHTS PROJECT

DEPARTMENT OF PUBLIC WORKS

CITY OF READING, PENNSYLVANIA

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CITY OF READING, PENNSYLVANIA

NOTICE TO CONTRACTORS

The City of Reading will receive sealed bids for the Wyomissing Street Lights project in the office of the City Purchasing Coordinator, Rm. 2-45, City Hall, 815 Washington Street, Reading, PA 19601 until 3:00 P.M., prevailing time on Friday, September 12, 2014.

Specifications and Proposal Forms for the above work can be obtained at the Office of the Purchasing Coordinator, City Hall or on the City's website at www.readingpa.gov.

Surety in the amount of ten percent (10%) of the proposal shall accompany each proposal. A certified check or proposal bond will be accepted.

A mandatory pre bid meeting will be held on Thursday, August 28, 2014 at 2:00 p.m. in City Council Chambers located at 815 Washington Street, Room 2-45, Reading, PA 19601.

The City of Reading reserves the right to accept or reject any and all proposals, and to accept or reject any part of any proposal that may not be in the public interest.

Attention is called to the fact that employees shall not be discriminated against because of race, color, age, religion, sex, national origin or sexual orientation.

Tammi Reinhart
Purchasing Coordinator

INSTRUCTIONS TO CONTRACTORS

NOTICE OF LETTING

Proposals for Wyomissing Street Lights project for City of Reading will be received by the Purchasing Coordinator until 3:00 P.M., prevailing time, on Friday, September 12, 2014, City Hall, Rm. 2-45, 815 Washington Street, Reading, PA 19601.

PRE-PROPOSAL MEETING (if specified)

There will be a mandatory pre bid meeting on Thursday, August 28, 2014 at 2:00 p.m. in City Council Chambers located at 815 Washington Street, 2nd Floor, Reading, PA 19601.

PROPOSAL SUBMISSION

Proposals shall be submitted in triplicate on the "Proposal Forms" included in the specifications for the work, and shall be based on the specifications. Each proposal should be submitted in a sealed envelope, and shall plainly indicate on it the title of the proposal, and the date for receiving the proposals. This shall be delivered to the City Purchasing Coordinator on or before the time stated in the NOTICE TO CONTRACTORS.

Proposals received at the Office of the Purchasing Coordinator after the hour specified, will not be considered. Contractors are invited to be present at the opening of proposals.

BONDS

Security, in the amount of ten percent (10%) of the proposal price shall accompany each proposal. This security may be a Certified or Cashier's Check, or a Proposal Bond furnished by a surety company, satisfactory to the City of Reading. The successful contractor, upon award of contract, shall furnish at the time of execution of the same, Payment Bond and a Performance Bond by a surety company acceptable to the City of Reading, in an amount equal to ONE HUNDRED PERCENT (100%) of the contract, to guarantee satisfactory performance. All bonds are subject to approval by the City Solicitor.

In case the contract is awarded to a contractor who fails to enter the contract or to deliver all required bonds and affidavits, the cash or check deposited shall become absolute property of the City; or if a bond has been deposited, it shall become payable immediately. Cash, checks or bonds deposited will be returned to unsuccessful vendors as soon as the contract is awarded, or all bids rejected.

INSURANCE

The Contractor, at the time of execution of the contract, shall also furnish the City with insurance certificates of adequate limits, as later indicated, to protect the City of Reading, its agents, and employees from any litigation involving Worker's Compensation, Public Liability and Property Damage, involved in the work. All subcontractors must also furnish copies of their liability insurance and Worker's Compensation Insurance certificates to the City. No subcontractor will

be allowed to perform any work under this contract by the City unless such certificates are submitted to and approved by the City beforehand.

WORKER'S COMPENSATION AND PUBLIC LIABILITY AND PROPERTY DAMAGE INSURANCE

The status of the Contractor in the work to be performed by him/her is that of any independent Contractor and as such, he/she shall properly safeguard against any and all injury or damage to the public, to public and private property, materials and things, and as such he/she alone shall be responsible for any and all damage, loss or injury to persons or property that may arise, or be incurred, in or during the conduct or progress of said work without regard to whether or not the Contractor, his/her sub-contractors, agents, or employees have been negligent, and the Contractor shall keep the City free and discharged of and from any and all responsibility and liability therefore of any sort or kind. The Contractor shall assume all responsibility for risks or casualties of every description, for any or all damage, loss or injury to persons or property arising out of the nature of the work from the action of the elements, or from any unforeseen or unusual difficulty. The Contractor shall assume and be liable for all blame and loss of whatsoever nature by reason of neglect or violation of any Federal, State, County or Local laws, regulations, or ordinances; the Contractor shall indemnify and save harmless the City from all suits or actions at law of any kind whatsoever in connection with this work and shall if required by the City, produce evidence of settlement of any such action before final payment shall be made by the City. Contractor's Liability Insurance Certificate shall include the save harmless clause and shall be filed with the City.

The Contractor shall maintain such insurance as will protect him/her from claims under workers' compensation acts and from claims for damages because of bodily injury, including death, and property damage, which may arise from and during operations under this Contract, whether such operations be by himself, by any subcontractor or anyone directly or indirectly employed by either of them. Contractor's liability insurance shall be in the names of the Contractor and the City, as their respective interests may appear. Certificates of such insurance shall be filed with the City.

The minimum amount of liability insurance to be maintained by the Contractor during the life of the contract shall be as follows:

Comprehensive General Liability – for bodily injury and property damage – including any liability normally covered by a general liability policy with limits of not less than $1,000,000 per occurrence and $2,000,000 in the annual aggregate.

Business Automobile Liability – For owned, non-owned, leased and hired vehicles with a combined single limit of not less than $1,000,000 for bodily injury and property damage.

Professional Liability – in minimum amounts of $1,000,000 per occurrence and $2,000,000 aggregate.

Worker's Compensation – Statutory limits in each state in which Service Provider is required to provide Worker's Compensation coverage including "All States" and "Voluntary Compensation" endorsement, and a Waiver of Subrogation endorsement in favor of the County.

Employer's Liability – with limits of not less than $100,000 Accident – Each Accident, $100,000 Disease – Each Employee; and $500,000 Disease – Policy Limit.

Prior to commencement of performance of this Agreement, Contractor shall furnish to the City a certificate of insurance evidencing all required coverage in at least the limits required herein, **naming the City of Reading, its elected officials, agents, and employees as additional insureds under the Comprehensive General Liability coverage**, and providing that no policies may be modified or cancelled without thirty (30) days advance written notice to the City. Such certificate shall be issued to***: City of Reading, 815 Washington Street, Reading, PA 19601.*** All policies shall be in effect with companies holding an A.M. Best rating of "A-" or better and shall be licensed to do business in the Commonwealth of Pennsylvania. Such companies shall also be acceptable to the City.

Please forward a certificate of insurance verifying these insurance requirements.

Errors and omissions insurance to cover any pollution liability incidents that may occur as a result of faulty testing procedures, methods and/or results.

Liability insurance shall include automobile coverage, including "hired automobiles and non-ownership automobiles.

All subcontractors performing work under this contract must furnish to the city a copy of their Certificate of Insurance for Workers' Compensation and liability for bodily injury and property damage.

Please provide verification for Pesticide or Herbicide Applicator Coverage.

WAGES AND EMPLOYMENT REQUIREMENTS

Each bidder shall include in their proposal a statement that they pay not less than the prevailing wages, if required.

EQUAL EMPLOYMENT OPPORTUNITY

During the performance of this Contract, the Contractor agrees as follows:

The Contractor will not discriminate against any employees or applicant for employment because of race, color, religion, sex, or national origin. The Contractor will take affirmative action to ensure that applicants are employed, and that employees are treated during employment, without regard to race, color, religion, sex, or national origin. Such action shall include, but not be limited to, the following: employment, upgrading, demotion, or transfer; recruitment or recruitment advertising; layoff or termination; rates of pay or other forms of compensation; and

selection for training, including apprenticeship. The Contractor agrees to post in conspicuous places, available to employees and applicants for employment, notices which may be provided by the City setting forth the provisions of this nondiscrimination clause.

The Contractor will, in all solicitations or advertisements for employees placed by or on behalf of the Contractor, state that all qualified applicants will receive consideration for employment without regard to race, color, religion, sex, or national origin.

The Contractor will send to each labor union or representative of workers with which the Contractor has a collective bargaining agreement or other contract or understanding, a notice advising the labor union or workers' representatives of the Contractor, commitments under this Section and shall post copies of the notice in conspicuous places available to employees and applicants for employment.

In the event of the Contractor's noncompliance with the non-discrimination clauses of this Contract or with any of the said rules, regulations, or orders, this Contract may be cancelled, terminated, or suspended in whole or in part and the Contractor may be declared ineligible for further City contracts.

The Contractor will include the provisions of these paragraphs in every subcontract or purchase order unless exempted.

EMPLOYMENT OF CERTAIN PERSONS PROHIBITED

No person who, at the time, is serving sentence in a penal or correctional institution shall be employed on the work covered by this Contract.

SUPERVISION OF WORKERS

The Contractor shall provide qualified supervision of each crew at all times while working under this contract. Each supervisor shall be authorized by the Contractor to act upon all directives issued by the City. Failure for the supervisor to act on said directives shall be sufficient cause to give notice that the contractor is in default of the contract unless such directives would create potential personal injury or safety hazards.

The contract will be under the direct supervision of the City or its authorized representatives. Any alterations or modifications of the work performed under this contract shall be made only be written agreement between the Contractor and the City authorized representatives and shall be made prior to commencement of the altered or modified work. No claims for extra work or materials shall be allowed unless covered by written agreement.

SUBCONTRACTS

The Contractor will not be allowed to subcontract work under this contract unless written approval is granted by the City. The Subcontractor, as approved, shall be bound by the conditions of the contract between the City and the Contractor. The authorization of a Subcontractor is to perform in accordance with all terms of the contract and specifications. All

required notices, work orders, directives, and requests for emergency services will be directed to the Contractor. All directions given to the Subcontractor in the field shall bind the Contractor as if the notice had been given directly to the Contractor.

QUALITY

Where a certain article or "Approved Equal" is specified and the contractor intends to furnish an article which the contractor considers equal to the one named, the contractor must specify in the proposal the name and grade of said article. All disputes concerning grade and quality of materials or work shall be determined by a person duly authorized by City Council.

TIME OF COMPLETION

The contractors are herewith cautioned that the time of completion indicated in their proposal must be complied with. To insure timely completion, the successful contractor will be required to furnish adequate equipment, and qualified personnel in sufficient numbers at all times.

Where a date is set for delivery of materials or the performance of work, said materials must be delivered, or work performed, in accordance with the specifications or description herein contained on or before said date, or the order to the delinquent party will be cancelled and awarded to the next lowest responsible contractor.

BUSINESS PRIVILEGE TAX

The City of Reading imposes a Business Privilege License, at $55.00 per calendar year. In addition, a Business Privilege Tax is imposed at the service rate of 2 ¼ mills upon the gross receipts attributable to business conducted within the City of Reading.

PERMITS/LICENSES

The Contractor shall, at his expense, pay all fees and procure all necessary licenses and permits needed to conduct the work required under the terms of this contract. The Contractor shall give any and all necessary formal notices required in conjunction with the lawful prosecution of the work of this contract.

BASIS OF PAYMENT

All prices to be quoted F.O.B. Reading, PA destination. The City of Reading is tax exempt.

OBSERVANCE OF LAWS, ORDINANCES AND REGULATIONS

The Contractor at all times during the term of this contract shall observe and abide by all Federal, State, and Local laws which in any way affect the conduct of the work and shall comply with all decrees and orders of courts of competent jurisdiction. The Contractor shall comply fully and completely with any and all applicable State and Federal Statutes, rules and regulations as they relate to hiring, wages, and any other applicable conditions of employment.

WITHDRAWAL OF PROPOSALS

Bidder will be given permission to withdraw any proposals after they have been received by the City's Purchasing Coordinator at his/her office, provided said request is in writing and properly signed. No proposals may be withdrawn for a period of thirty (30) days following the formal opening and receipt of proposals by City Council.

After a proposal has been opened, it may not be withdrawn except as provided by Act of January 23, 1974, P.L. 9 No. 4 as same may be amended.

NO CONTACT POLICY

After the date and time established for the receipt of proposals by the city, any contact by any proposer with any city representative, other than the Purchasing Coordinator, concerning the RFP is prohibited. Any such unauthorized contact may cause the disqualification of the proposer from this procurement action.

CITY VENDOR PREFERENCE

Per its charter, the city reserves the right to offer a ten percent (10%) preference to a business or individual headquartered in the city.

PROPOSAL REJECTION

The City of Reading reserves the right to reject any or all proposals and to accept or reject any part of any proposal. It also reserves the right to waive any technical defects or minor irregularities, which in its discretion, is in the best interest of the City.

EXECUTION OF CONTRACT

The successful vendor shall, within ten (10) calendar days after mailing of contract documents by the City to the Principal, enter into contract with the City on form as included within the proposal documents for the appropriate bonds, indemnities and insurances required hereunder.

The contract, when executed, shall be deemed to include the entire agreement between the parties; the Contractor shall not base any claim for modification of the contract upon any prior representation or promise made by the representatives or the City, or other persons.

All attachments are considered as part of this document.

METHOD OF PAYMENT

All City of Reading disbursement requests on this contract shall be based and computed on invoices submitted by the Contractor/Successful Vendor or approved representative (Manager) on a monthly basis for actual work done according to the contract specifications and City codes and approved by a City official or person representing a City official.

The City shall have the right to withhold disbursement funds if in the City's opinion work for which payment has been requested is of poor workmanship, contrary to any applicable codes and contract specifications, violation of appropriate paperwork requirements that are not up to date and approved for this billing period, Contractor/Successful Vendor fails to comply with this Agreement, or for other conditions or circumstances which the City deems not to be in the best interest of the public.

NOTICE TO PROCEED

The Contractor shall begin work on the job site within five (5) days after receiving Notice to Proceed from the City.

DISCONTINUANCE OF WORK

Any practice obviously hazardous as determined by the City shall be immediately discontinued by the Contractor upon receipt of either written or oral notice to discontinue such practice.

CONTRACT TERMINATION

The City shall have the right to terminate a contract or a part thereof before the work is completed in the event:

1. Previous unknown circumstances arise making it desirable in the public interest to void the contract.
2. The contractor is not adequately complying with the specifications.
3. The contractor refuses, neglects, or fails to supply properly trained or skilled supervisory personal and/or workers or proper equipment.
4. The contractor in the judgment of the City is unnecessarily or willfully delaying the performance and completion of the work.
5. The contractor refuses to proceed with work when and as directed by the City.
6. The contractor abandons the work.

QUESTIONS REGARDING SPECIFICATIONS OR PROPOSAL PROCESS

To ensure fair consideration for all firms, the City prohibits communication to or with any department director, division manager, or employee during the submission process with the exception of those questions relative to interpretation of specifications or the proposal process. Such communications initiated by a firm may be grounds for disqualifying the offending firm from consideration for award of the proposal and/or any future proposal.

No interpretations of the meaning of the RFP documents will be made to any bidder orally. Every request for such interpretation shall be in writing to the City of Reading Purchasing Office, and to be given consideration must be received in writing prior to 12:00 PM on Thursday, September 4, 2014. Direct inquiries to:

Tammi Reinhart
Purchasing Coordinator
City Hall, Rm. 2-45
815 Washington Street
Reading, PA 19601
FAX - (610) 655-6427
tammi.reinhart@readingpa.org

Any and all such interpretation will be in the form of an Addendum to the Contract Documents and will be issued to all prospective firms on Friday, September 5, 2014.

Additionally, the City prohibits communications initiated by a proposer to the City Official or employee evaluating or considering the proposals prior to the time an award decision has been made. Any communication between proposer and the City will be initiated by the appropriate City Official or employee in order to obtain information or clarification needed to develop a proper, accurate evaluation of the proposal. Such communications initiated by a proposer may be grounds for disqualifying the offending proposer from consideration for award of the proposal and/or any future proposal.

DOCUMENTS TO BE SUBMITTED WITH BID

PROPOSAL

FOR

WYOMISSING STREET LIGHTS PROJECT

READING, PENNSYLVANIA

Proposal of

_____

(name)

_____

(address)

TO: Mayor Vaughn Spencer
City of Reading
815 Washington Street
Reading, PA 19601

In conformity with City specifications and the Contract Documents, including the instructions to Contractors, Form of Proposal, Proposal Bond and Conditions, the undersigned submits this proposal, and encloses herewith as proposal guaranty, a Certified or Treasurer's Check, or Proposal Bond, in an amount not less than 10% of the proposal herein submitted, which it is understood will be forfeited if this proposal is accepted by the City of Reading, and the undersigned fails to furnish approved bonds and execute the contract within the time stipulated; otherwise, the guarantee will be returned.

The undersigned declares that no Member of Council, Director of Department or Division Manager, deputy thereof or clerk therein, or other officer of the City of Reading, is directly or indirectly interested as principal, surety of otherwise in this proposal or has any supervision or overall responsibility for the implementation in administration of the contract.

It is certified that the undersigned is the only person(s) interested in this proposal as principal and that the proposal is made without collusion with any person, firm, or corporation.

It is hereby agreed to execute the contract and furnish surety company bonds, on the forms enclosed in the Contract Documents, in the amount of 100% of the contract price within ten (10) days of mailing of the contract documents from the City to the Principal, and to begin work within five (5) days after receipt of Notice to Proceed from the City of Reading.

It is proposed to furnish and deliver all materials, tools, equipment, power, tests and transportation, perform all labor, superintendence, and all means of construction, and do all incidental work, and to execute, construct and finish in an expeditious and workman-like

manner, in accordance with the plans and specifications, to the satisfaction and acceptance of the Department of Public Works of the City of Reading and its Engineer or Architect, for Wyomissing Street Lights project at the locations specified, for the total sum as herein bid:

TOTAL PRICE:

_____ _____
(written)

($_____).
(figures)

IN WITNESS WHEREOF, this proposal has been executed this _____ day of_____ A.D. 20 __.
by the setting hereunto of his or its hand and seal.

FOR INDIVIDUAL:

_____(Seal)

FOR CORPORATION:

_____
(Name of Corporation)

By:

_____
(Official Title)

Attest:

_____
(Secretary or Asst. Secretary)

FOR PARTNERSHIP:

_____
(Name of Partnership)

By:

_____(Seal)

_____(Seal)
Partners

FORM OF BID BOND

BOND

KNOW ALL MEN BY THESE PRESENTS that we, the undersigned,

_____, as Principal (the "Principal"), and _____ a corporation organized and existing under laws of the _____ of _____, as Surety (the "Surety"), are held and firmly bound unto _____ as Obligee (the "Obligee"), as hereinafter set forth, in the full and just sum of _____ Dollars ($_____), lawful money of the United States of America, for the payment of which sum we bind ourselves, our heirs, administrators, executors, successors and assigns, jointly and severally, firmly by these presents.

WITNESSETH THAT:

WHEREAS, the Principal herewith is submitting a Proposal to the Obligee to perform the _____ Work in connection with the construction of _____ pursuant to plans, specifications and other documents constituting the Contract Documents which are incorporated into said Proposal by reference (the "Contract Documents"), as prepared by the Division of Parks, City Hall, 8th & Washington Streets, Reading, PA 19601.

WHEREAS, it is a condition of the receipt and consideration by the Obligee of said Proposal that it shall be accompanied by proposal guaranty to be held by the Obligee on terms hereinafter set forth.

NOW, THEREFORE, the condition of this Bond shall be such that, if the Principal, within ten (10) days after mailing of contract document by the City to Principal, shall furnish to the Obligee a Performance Bond and a Payment Bond and, upon award of a contract to him by he Obligee, shall execute and deliver the Agreement and furnish to the Obligee proper evidence of effectiveness of insurance coverage, respectively within the time, in the forms and in the amounts, as appropriate, required by the Contract Documents, then this Bond shall be void, otherwise, this Bond shall remain in full force and effect.

The Principal and the Surety agree to pay to the Obligee the difference between the amount of said Proposal, as accepted by the Obligee, and any higher amount for which the required work shall be contracted for by the Obligee, together with any additional advertising costs, architect's fees, legal fees and any all other fees and expenses incurred by the Obligee by reason of the failure of the Principal to enter into such Agreement with the obligee, or to furnish such Contract Bonds, or to furnish evidence of effectiveness of such insurance coverage; Provided, however, that (1) the obligation of the Surety shall not exceed the stated principal amount of this Bond; and (2) if the Obligee should not procure an executed contract with any other person for the performance of the work contemplated in said Proposal, as accepted by the Obligee, upon the same terms and conditions, other than price, as provided in the Contract Documents, within the period provided in the Contract Documents during which no proposals of contractors may be withdrawn, whether because of the lack of other proposals, or because of the inability or refusal of any other contractor to enter into an appropriate contract, or because the cost under any higher proposal would be greater than the Obligee shall determine, in its sole discretion, that it can afford, then the Principal and the Surety agree to pay to the Obligee the full amount of this Bond as liquidated damages.

IN WITNESS WHEREOF, the Principal and the Surety cause this Bond to be signed, sealed and delivered this _____day of _____, 20__.

(INDIVIDUAL PRINCIPAL)

_____(Seal)
(Signature of Individual)

Witness:

_____

Trading and Doing Business as:

_____

(PARTNERSHIP PRINCIPAL)

_____(Seal)
(Name of Partnership)

Witness:

_____ By: _____(Seal)
(Partner)

Witness:

_____ By: _____(Seal)
(Partner)

Witness:

_____ By: _____(Seal)
(Partner)

Witness:

_____ By: _____(Seal)
(Partner)

(CORPORATION PRINCIPAL)

Attest:

_____
(Asst. Secretary)

_____
(Name of Corporation)

By:_____
(Vice) President

(Corporate Seal)

or (if appropriate)

_____
(Name of Corporation)

By: _____
(Officer or Auth. Rep.)
Title:_____

*Attach appropriate proof, dated as of the same date as the Bond, evidencing authority to execute in behalf of the corporation.

Signed _____

_____
(Title)

Subscribed and sworn to before me on

this ___ day of _____, 20 ___

_____

_____
(Title)

My commission expires:

_____

(Corporation Surety)

_____
(Name of Corporation)

By: _____
Attorney-in-fact

Witness:

_____

(Corporate Seal)

**Attach an appropriate power of attorney, valid and in effect as of the date of this affidavit, evidencing the authority of the Attorney-In-Fact to act in behalf of the corporation.

NON-COLLUSION AFFIDAVIT

INSTRUCTIONS FOR NON-COLLUSION AFFIDAVIT

1. This Non-Collusion Affidavit is material to any contract pursuant to this proposal. According to the Pennsylvania Antibid-Rigging Act, 73 P.S. 1611 et seq., governmental agencies may require Non-Collusion Affidavits to be submitted together with bids.

2. This Non-Collusion affidavit must be executed by the member, officer, or employee of the bidder who is authorized to legally bind the bidder.

3. Bid rigging and other efforts to restrain competition, and the making of false sworn statements in connection with the submission of bids are unlawful and may be subject to criminal prosecution. The person who signs the Affidavit should examine it carefully before signing and assure himself or herself that each statement is true and accurate, making diligent inquiry, as necessary, of all other persons employed by or associated with the bidder with responsibilities for the preparation, approval, or submission of the bid.

4. In the case of a bid submitted by a joint venture, each party to the venture must be identified in the bid documents, and an Affidavit must be submitted separately on behalf of each party.

5. The term "complementary bid" as used in the Affidavit has the meaning commonly associated with that term in the bidding process, and includes the knowing submission of bids higher than the bid of another firm, any intentionally high or noncompetitive bid, and any form of bid submitted for the purpose of giving a false appearance of competition.

6. Failure to file an Affidavit in compliance with these instructions will result in disqualification of the bid.

NON-COLLUSION AFFIDAVIT OF PRIME BIDDER

State of _____

County of _____

_____, being first duly sworn, deposes and says that:

(1) He/She is_____
(Owner, Partner, Officer, Representative or Agent)
of _____, the Bidder
that has submitted the attached Bid or Bids;

(2) He/She is fully informed respecting the preparation and contents of the attached Bid and of all pertinent circumstances respecting such Bid;

(3) Such Bid is genuine and is not a collusive or sham Bid;

(4) Neither the said Bidder nor any of its officers; partners, owners, agents, representatives, employees or parties in interest, including this affiant, has in any way colluded, conspired, connived or agreed, directly or indirectly, with any other Bidder, firm or person to submit a collusive or sham Bid in connection with the Contract for which the attached Bid has been submitted or to refrain from bidding in connection with such Contract, or has in any manner, directly or indirectly, sought by agreement or collusion or communication of conference with any other Bidder, firm or person to fix the price or prices in the attached Bid or of any other Bidder, or to fix any overheld, profit or cost element of the Bid price or the Bid price of any other Bidder, or to secure through any collusion, conspiracy, connivance or unlawful agreement any advantage against the City of Reading or any person interested in the proposed Contract;

(5) The price or prices quoted in the attached Bid are fair and proper and are not tainted by any collusion, conspiracy, connivance or unlawful agreement on the part of the Bidder or any of its agents, representatives, owners, employees, or parties in interest, including this affiant; and,

(6) Neither the said Bidder nor any of its officers, partners, owners, agents or parties in interest, have any interest, present or prospective, that can be reasonably construed to result in a conflict of interest between them and the City of Reading, which the Bidder will be required to perform.

I state that _____ understands and acknowledges that the above
(Name of Firm)
representations are material and important, and will be relied on by the City of Reading in awarding the contract(s) for which this bid is submitted. I understand and my firm understands that any misstatement in this affidavit is and shall be treated as fraudulent concealment from the City of Reading of the true facts relating to the submission of bids for this contract.

_____
(Name and Company Position)

SWORN TO AND SUBSCRIBED
BEFORE ME THIS _____
DAY OF _____, 20___

_____ My Commission Expires
Notary Public

CONTRACT DOCUMENTS

C O N T R A C T

NOTE; This contract is not to be filled in until contract is awarded.

THIS AGREEMENT, made and concluded this _____ day of _____, in the year two thousand and _____, by and between the City of Reading, a municipal corporation of the Commonwealth of Pennsylvania, located in the County of Berks, said Commonwealth, party of the first part, and _____, Contractor, party of the second part, pursuant to law and to the provisions and requirements of the ordinance of the City of Reading, Pennsylvania.

WITNESSETH, that the parties to these presents, each in consideration of the agreements on the part of the other herein contained, have agreed, and hereby do agree, the party of the first part for itself, its successors and assign, and the party of the second part for itself, himself, or themselves, its successors, or his or their executors and administrators as follows:

CONTRACTOR'S GENERAL AGREEMENT. The Contractor covenant, promises and agrees to and with the party of the first part, for the consideration hereinafter mentioned and contained, and under the penalty expressed in a bond bearing date of _____ and hereto attached, to furnish all the material, machinery, equipment, tools, labor and transportation, except as hereinafter otherwise provided, at his own cost, necessary or proper for the purpose of executing the work embraced in this contract in a good, substantial and workmanlike manner, and in strict accordance with the specifications pertaining to this contract a herein contained.

PARTS OF CONTRACT. The Location Map; Notice to Contractors; Bid Instructions; Documents to be Submitted with Bid; Contract Documents; Documents to be Submitted During the Course of the Contract; Wage Rate Determinations; Notice of Preconstruction Requirements and Pre-Construction Conference Questionnaire; Affirmative Action Requirements; General Provisions; Supplementary General Terms and Conditions; Technical Specifications; Supplementary Technical Specifications; and Correspondence and Supportive Documentation shall each form a part of the Contract.

THE CONTRACT SUM. The City shall pay the Contractor for the performance of the Contract, subject to additions and deductions provided therein, in current funds as follows: _____ _____ (state here the lump sum amount, unit prices, or both as desired in individual cases.)

Where the quantities originally contemplated are so changed that application of the agreed unit price to the quantity of work performed is shown to create a hardship to the Owner or the Contractor, there shall be an equitable adjustment of the Contract to prevent such hardship.

TIME & MANNER OF DOING WORK. The party of the second part agrees to commence the construction of the work to be done under this contract, immediately upon receiving written notice from the Director of Parks & Public Buildings, or other applicable Director, so to do and to complete the entire work not later than October 31, 2004 it being expressly agreed and understood that the time of beginning, rates of progress and time of completion of the work are essential under this contract. Time is to be considered to be the essence of this contract.

STIPULATED DAMAGES. The Contractor shall begin work within five (5) days of receipt of written notice from the applicable Director, to do so. If the Contractor fails to complete and finish the work in conformity with the terms and provisions of this Contract within the time herein before specified, he shall pay to the City the sum of One Hundred Dollars ($100.00) for each and every day thereafter, including Sundays and holidays, that the finishing of the Contract is delayed, which sum shall be construed as stipulated and liquidated damages and not as a penalty and shall be deducted from the amount due by the terms of the Contract; provided, however, that in case of justifiable delay, the City shall extend the time for completion of said work as provided for in Article G.7, but no extension of time for any reason beyond the time fixed herein for the completion of the work shall be deemed a waiver by the City of the right to abrogate this Contract for abandonment for delay.

LIENS. Neither the final payment nor any part of the retained percentage shall become due until the Contractor, if required, shall deliver to the City a complete release of all liens arising out of this Contract, or receipts in full in lien thereof, and, if required in either case, an affidavit that so far as he has knowledge or information the release and receipts include all the labor and material for which a lien could be filed. If any lien remains unsatisfied after all payments are made, the Contractor shall refund to the City all monies that the latter may be compelled to pay in discharging such a lien, including all costs and a reasonable attorney's fee.

BASIS OF CONTRACT. This contract is founded on _____ _____

_____

_____

IN WITNESS WHEREOF, the said City of Reading has caused this Agreement to be executed by its Mayor, and its corporate seal to be hereunto affixed, duly attested by its City Clerk, and the party of the second part.

_____

_____

the day and year first above written.

CITY OF READING

BY: _____
Mayor

ATTEST:

_____
City Clerk

Signed and Sealed in the Presence of

_____
CONTRACTOR

_____
PRESIDENT

_____
SECRETARY

CONTRACT NO. _____

PERFORMANCE BOND

Know all men by these presents that we, _____herein after called the Principal, and _____, hereinafter called the SURETY, a corporation organized and existing under the laws of the state of Pennsylvania are held and firmly bound unto the City of Reading, hereinafter called the OBLIGEE, as hereinafter set forth, in the full and just sum of _____ Dollars & 00/100 ($_____), lawful money of the United States of America, for the payment of which sum we bind ourselves, our heirs, executors, administrators, successors and assigns, jointly and severally, firmly by these presents.

WITNESSETH THAT:

WHEREAS, the PRINCIPAL heretofore submitted to the OBLIGEE a certain proposal, dated _____, 20 ___, to perform the WORK for the OBLIGEE, in connection with the _____
_____

_____

_____

WHEREAS, the OBLIGEE is a "contracting body" under provisions of the Act of the General Assembly of the Commonwealth of Pennsylvania, approved by the Governor on December 20, 1967, known and cited as the "Public Works Contractors Bond Law of 1967", PL 869 (the Act"); and

WHEREAS, the Act, in Section 3(a), requires that, before an award shall be made to the PRINCIPAL by the OBLIGEE in accordance with the PROPOSAL, the PRINCIPAL shall furnish this BOND to the OBLIGEE, with this Bond to become binding upon the award of the CONTRACT to the PRINCIPAL by the OBLIGEE in accordance with the PROPOSAL; and

WHEREAS, it also is a condition of the CONTRACT DOCUMENTS that this BOND shall be furnished by the PRINCIPAL to the OBLIGEE; and

WHEREAS, under the CONTRACTOR DOCUMENTS, it is provided, inter alia, that if the PRINCIPAL shall furnish this BOND to the OBLIGEE, and if the OBLIGEE shall make an award to the PRINCIPAL in accordance with the PROPOSAL, then the PRINCIPAL and the OBLIGEE shall enter into a CONTRACT with respect to performance of the WORK, the form of which CONTRACT is set forth in the CONTRACT DOCUMENTS.

NOW, THEREFORE, the terms and conditions of this BOND are and shall be that if the PRINCIPAL and any SUBCONTRACTOR of the PRINCIPAL to whom any portion of the WORK shall be subcontracted, and if all assignees of the PRINCIPAL and of any such SUBCONTRACTOR, promptly shall pay or shall cause to be paid, in full, all money which may be due any claimant supplying labor or materials in the prosecution and performance of the

WORK in accordance with the CONTRACT DOCUMENTS, including any amendment, extension or addition to the CONTRACT DOCUMENTS, for material furnished or labor supplied or labor performed, then this BOND shall be void; otherwise, this BOND shall be and shall remain in force and effect.

This BOND, is executed and delivered under and subject to the Act, to which reference hereby is made.

The PRINCIPAL and the SURETY agree that any alterations, changes and/or additions to the CONTRACT DOCUMENTS, and/or any alterations, changes and/or additions to the WORK to be performed in accordance with the CONTRACT DOCUMENTS, and/or any alterations, changes and/or additions to the CONTRACT, and/or any giving by the OBLIGEE of any extensions of time for the performance of the WORK in accordance with the CONTRACT DOCUMENTS, shall not release, in any manner whatsoever, the PRINCIPAL and the SURETY, or either of them, or their heirs, executors, administrators, successors and assigns, from liability and obligations under this BOND; and the SURETY, for value received, does waive notice of any such alterations, changes, additions, extensions of time, act of forebearance and/or reduction of retained percentage.

IN WITNESS WHEREOF, the PRINCIPAL and the SURETY cause this bond to be signed, sealed and delivered this _____ day of _____, 20__.

(INDIVIDUAL PRINCIPAL)

_____(Seal)
(Signature of Individual)

Witness:

_____

Trading and Doing Business as:

_____

(PARTNERSHIP PRINCIPAL)

_____(Seal)
(Name of Partnership)

Witness:

_____ By: _____(Seal)
(Partner)

Witness:

_____ By: _____(Seal)
(Partner)

Witness:

_____ By: _____(Seal)
(Partner)

Witness:

_____ By: _____(Seal)
(Partner)

(CORPORATION PRINCIPAL)

Attest:

_____
(Asst. Secretary)

_____
(Name of Corporation)

By:_____
(Vice) President

(Corporate Seal)

or (if appropriate)

_____
(Name of Corporation)

By: _____
(Officer or Auth. Rep.)
Title:_____

*Attach appropriate proof, dated as of the same date as the Bond, evidencing authority to execute in behalf of the corporation.

Signed _____

_____
(Title)

Subscribed and sworn to before me on

this ___ day of _____, 20 ___

_____

_____
(Title)

My commission expires:

_____

(Corporation Surety)

_____
(Name of Corporation)

By: _____
Attorney-in-fact

Witness:

_____

(Corporate Seal)

**Attach an appropriate power of attorney, valid and in effect as of the date of this affidavit, evidencing the authority of the Attorney-In-Fact to act in behalf of the corporation.

PAYMENT BOND

Know All Men by These Presents That We, _____
(CONTRACTOR)

hereinafter called the PRINCIPAL, and _____,
(SURETY)

hereinafter called the SURETY, a corporation organized and existing under laws of the _____ of _____ are held and firmly bound unto _____, hereinafter called the OBLIGEE, as hereinafter set forth, in the full and just sum of _____ dollar (_____), lawful money of the United States of America, for the payment of which we bind ourselves, our heirs, executors, administrators, successors and assigns, jointly and severally, firmly by these presents.

Witnesseth That:

WHEREAS, the PRINCIPAL heretofore submitted to the OBLIGEE a certain PROPOSAL, dated _____, 20 __, to perform the WORK for the OBLIGEE, in connection with the _____

_____

as set forth in the CONTRACT, DOCUMENTS; and _____

Public Affairs, City of Reading, Pennsylvania.

WHEREAS, the OBLIGEE is a "contracting body" under provisions of the Act of the General Assembly of the Commonwealth of Pennsylvania, approved by the Governor on December 20, 1967, known as and cited as the "Public Works Contractors" Bond Law of 1967", P L 869 (the Act"): and

WHEREAS, the Act, in section 3(a), requires that, before an award shall be made to the PRINCIPAL by the OBLIGEE in accordance with the PROPOSAL, the PRINCIPAL shall furnish this BOND to the OBLIGEE, with this BOND to become binding upon the award of a CONTRACT to the PRINCIPAL by the OBLIGEE in accordance with the PROPOSAL: and

WHEREAS, it also is a condition of the CONTRACT DOCUMENTS that this BOND shall be furnished by the PRINCIPAL to the OBLIGEE; and

WHEREAS, under the CONTRACTOR DOCUMENTS, it is provided, inter alia, that if the PRINCIPAL shall furnish this BOND to the OBLIGEE, and if the OBLIGEE shall make an award to the PRINCIPAL in accordance with the PROPOSAL then the PRINCIPAL and the OBLIGEE shall enter into a CONTRACT with respect to performance of the WORK, the form of which CONTRACT is set forth in the CONTRACT DOCUMENTS.

NOW, THEREFORE, the terms and conditions of this BOND are and shall be that if the PRINCIPAL and any SUBCONTRACTOR of the PRINCIPAL to whom any portion of the WORK shall be subcontracted, and if all assignees of the PRINCIPAL and of any such SUBCONTRACTOR, promptly shall pay or shall cause to be paid, in full all money which may be due any claimant supplying labor or materials in the prosecution and performance of the WORK in accordance with the CONTRACT DOCUMENTS, including any amendment, extension or addition to the CONTRACT DOCUMENTS, for material furnished or labor supplied or labor performed, then this BOND shall be void; otherwise, this BOND shall be and shall remain in force and effect.

This BOND, as provided by the Act, shall be solely for the protection of claimants supplying labor or materials to the PRINCIPAL or to any SUBCONTRACTOR of the PRINCIPAL in the prosecution of the WORK covered by the CONTRACT DOCUMENTS, including any amendment, extension or addition thereto. The term "claimant", where used herein and as required by the Act, shall mean any individual, firm, partnership, association or corporation. The phrase "labor or materials", when used herein and as required by the Act, shall include public utility services and reasonable rentals of equipment, but only for periods when he equipment rented is actually used at the site of the WORK covered by the CONTRACT. As required by the Act, the provisions of this BOND shall be applicable whether or not the material furnished or labor performed enters into and becomes a component part of the public building, public work or public improvement contemplated by the CONTRACT DOCUMENTS.

As provided and required by the Act, the PRINCIPAL and the SURETY agree that any claimant, who has performed labor or furnished material in the prosecution of the WORK in accordance with the CONTRACT DOCUMENTS, including any amendment, extension or addition to the CONTRACT DOCUMENTS, and who has not been paid therefore, in full, before the expiration of ninety (90) days after the last day on which such claimant performed the last of such labor or furnished the last of such materials for which payment is claimed, may institute an action upon this BOND, in the name of the claimant, in assumpsit, to recover any amount due the claimant for such labor or material, and may prosecute such action to final judgment and may have execution upon the judgment; provided, however, that:

(a) Any claimant who has a direct contractual relationship with any SUBCONTRACTOR of the PRINCIPAL, but has no contractual relationship, express or implied, with the PRINCIPAL, may institute an action upon this BOND only if such claimant first shall have given written notice, served in the manner provided in the Act, to the PRINCIPAL, within ninety (90) days from the date upon which such claimant performed in the last of the labor or furnished the last of the materials for which payment is claimed, stating, with substantial accuracy, the amount

claimed and the name of the person for whom the WORK was performed or to whom the material was furnished; and

(b) No action upon this BOND shall be commenced after the expiration of one (1) year from the day upon which the last of the labor was performed or material was supplied, for the payment of which such action is instituted by the claimant; and

(c) Every action upon this BOND shall be instituted either in the appropriate court of the County where the WORK is to be performed or of such other County as Pennsylvania statutes shall provide, or in the United States District Court for the district in which the PROJECT, to which the CONTRACT relates, is situated, and not elsewhere.

This BOND is executed and delivered under and subject to the Act, to which reference hereby is made.

The PRINCIPAL and the SURETY agree that any alterations, changes and/or additions to the CONTRACT DOCUMENTS, and/or any alterations, changes and/or additions to the WORK to be performed in accordance with the CONTRACT DOCUMENTS, and/or any alterations, changes and/or additions to the CONTRACT, and/or any given by the OBLIGEE of any extensions of time for the performance of the WORK in accordance with the CONTRACT DOCUMENTS, and/or any act of forebearance of either the PRINCIPAL or the OBLIGEE toward the other with respect to the CONTRACT DOCUMENTS, and/or the reduction of any percentage to be retained by the OBLIGEE as permitted by the CONTRACT DOCUMENTS, shall not release, in any manner whatsoever, the PRINCIPAL and the SURETY, or either of them, or their heirs, executors, administrators, successors and assigns, from liability and obligations under this BOND; and the SURETY for value received, does waive notice of any such alterations, changes, additions, extensions of time, acts of forebearance and/or reduction of retained percentage.

If the PRINCIPAL is a foreign corporation (incorporated under the laws other than those of the Commonwealth of Pennsylvania) then further terms and conditions of this BOND are and shall be that the PRINCIPAL or the SURETY shall not be discharged from liability on this BOND, nor this BOND surrendered until such PRINCIPAL files with the OBLIGEE a certificate from the Pennsylvania Department of Revenue evidencing the payment in full of all bonus taxes, penalties and interest, and a certificate from the Bureau of Employment and Unemployment Compensation of the Pennsylvania Department of Labor and Industry, evidencing the payment of all unemployment compensation, contributions, penalties and interest due the Commonwealth from said PRINCIPAL or any foreign corporation,

SUBCONTRACTOR thereunder or for which liability has accrued but the time for payment has not arrived, all in accordance with provisions of the Act of June 10, 1947, P.L 493, of the Commonwealth of Pennsylvania.

In Witness Whereof, the PRINCIPAL and the SURETY cause this BOND to be signed, sealed and delivered this _____day of _____, 20 __.

(INDIVIDUAL PRINCIPAL)

_____(Seal)
(Signature of Individual)

Witness:

_____

Trading and Doing Business as:

_____

(PARTNERSHIP PRINCIPAL)

_____(Seal)
(Name of Partnership)

Witness:

_____ By: _____(Seal)
(Partner)

Witness:

_____ By: _____(Seal)
(Partner)

Witness:

_____ By: _____(Seal)
(Partner)

Witness:

_____ By: _____(Seal)
(Partner)

(CORPORATION PRINCIPAL)

Attest:

_____
(Asst. Secretary)

_____
(Name of Corporation)

By:_____
(Vice) President

(Corporate Seal)

or (if appropriate)

_____
(Name of Corporation)

By: _____
(Officer or Auth. Rep.)
Title:_____

*Attach appropriate proof, dated as of the same date as the Bond, evidencing authority to execute in behalf of the corporation.

Signed _____

_____
(Title)

Subscribed and sworn to before me on

this ___ day of _____, 20 ___

_____

_____
(Title)

My commission expires:

_____

(Corporation Surety)

_____
(Name of Corporation)

By: _____
Attorney-in-fact

Witness:

_____

(Corporate Seal)

**Attach an appropriate power of attorney, valid and in effect as of the date of this affidavit, evidencing the authority of the Attorney-In-Fact to act in behalf of the corporation.

STATEMENT

Accepting Provisions of the Workers' Compensation Act

STATE OF _____)
) ss.
COUNTY OF _____)

The undersigned contractor has accepted the provisions of the Workers' Compensation Act of Pennsylvania, with all supplements, and has insured liability thereunder in accordance with the terms thereof with the insurance company whose signature is attached hereto.

For Individual

_____ (Seal)

For Corporation

_____
(Name of Corporation)

By: _____
(Official Title)

Attest: _____
(Secretary or Asst. Secretary)

For Partnership

_____
(Name of Partnership)

By: _____ (Seal)

_____ (Seal)
(Partners)

_____
(Name of Insurance Company)

By: _____
Attorney-in-Fact

INDEMNITY AGREEMENT & HOLD HARMLESS

KNOW ALL MEN BY THESE PRESENTS:

WHEREAS, the undersigned has entered into a contract with the CITY OF READING, dated _____, 20 __, providing for the _____
_____
_____
City of Reading, Pennsylvania.

NOW, THEREFORE, in consideration of the award of said contract to the undersigned, _____, as well as in further consideration of the sum of ONE DOLLAR ($1.00) in hand paid to the said _____by the City of Reading, receipt whereof is hereby acknowledged, the said _____ agrees to indemnify and save harmless the CITY OF READING, its officers, agents, servants, and employees against any and all loss, damage, costs and expenses which the said CITY may hereafter suffer, incur, be put to or pay by reason of any bodily injury (including death) or damage to property arising out of any act or omission in performance of the work undertaken under the aforesaid contract.

EXECUTED this _____ day of _____, 20__.

By: _____

Title: _____

ATTEST:

_____

_____
(Title)

STIPULATION AGAINST LIENS

WHEREAS, _____, hereinafter called the CONTRACTOR, has entered into a CONTRACT, dated _____, 20 __, with _____ hereinafter called the CITY, to provide materials and perform labor necessary for the _____ _____ as set forth in the CONTRACT DOCUMENTS.

NOW, THEREFORE, it is hereby stipulated and agreed by and between the said parties, as part of the said CONTRACT, and for the consideration therein set forth, that neither the undersigned CONTRACTOR, any SUBCONTRACTOR or material man, nor any other person furnishing labor or materials to the said CONTRACTOR under this CONTRACT shall file a lien, commonly called a mechanic's lien, for WORK done or materials furnished for the above contract.

This stipulation is made and shall be filed with the Berks County Prothonotary within ten (10) days after execution, in accordance with the requirements of Section 1402 of the Mechanics Lien Law of 1963 of the Commonwealth of Pennsylvania in such case provided.

IN WITNESS WHEREOF, the parties hereto have caused the signature of their proper officers to be affixed thereto on this _____ day of _____, 20___.

(SEAL)

_____ By:_____
(CITY OF READING)

Title: _____

ATTEST:

By: _____

Title: _____

(SEAL)

_____
(Contractor)

ATTEST: By: _____

Title: _____

NON DISCRIMINATION STATEMENT

The undersigned hereby certifies that it shall not discriminate against any employee or applicant for employment because of race, color, religion, sex, handicap, familial status, or national origin. The undersigned shall take affirmative action to insure that applicants for employment are employed, and that employees are treated during employment, without regard to their race, color, religion, sex, handicap, familial status, or national origin.

_____

_____
BIDDER

_____
TITLE

NOTICE TO PROCEED

TO:

Project_____

Contract No._____

Amount of Contract_____

You are hereby notified to commence work on the referenced contract on or before _____, 20___, and shall fully complete all of the work of said contract within_____ consecutive calendar days thereafter. Your completion date is therefore_____, 20____.

The contract provides for an assessment of the sum of $_____ as liquidated damages for each consecutive calendar day after the above established contract completion date that the work remains incomplete.

Dated this _____day of _____, 20___.

By_____

Title_____

ACCEPTANCE OF NOTICE

Receipt of foregoing Notice to Proceed is hereby acknowledged

By _____

this _____day of _____ 20_____.

By _____

Title _____

GENERAL PROVISIONS

GENERAL PROVISIONS

G.1 SUB-HEADINGS. The paragraph headings are inserted in these provisions and the following specifications for convenience only and shall not be considered as interpreting or limiting the application of paragraphs.

G.2 DEFINITIONS. The following terms and expressions used in this contract and specifications shall be understood as follows:

The expression "The City" shall mean the City of Reading, Pennsylvania, the party of the first part to this contract.

The word "Engineer" shall mean the Engineer, Architect, or other official in direct charge of the work for the City or his authorized representative as designated by the applicable Director.

The word "Inspector" shall mean an inspector of the City assigned to the inspection of materials, structures and workmanship under this contract.

The word "Contractor" shall mean the party of the second part to this contract, whether a corporation, partnership, or individual.

The word "Specifications" shall mean the specifications describing the work, the drawings, and the general provisions.

The word "Drawings/Plans" shall mean the general drawings, plans, maps, diagrams or illustrations accompanying these specifications, and such supplementary drawings as may be furnished from time to time.

The term "Materials" as used herein includes, in addition, to materials incorporated in the project used or to be used in the operation thereof, equipment and other materials used and/or consumed in the performance of the work.

Wherever in the specifications the words "to be," "to be done," "if," "as," "directed," "required," "permitted," "ordered," "instructed," "designated," "considered necessary," or words of like import are used, it shall be understood that the direction, requirement, permission, order, instruction, designation or decision of the Engineer is intended, and similarly the words "approved," "acceptable," "satisfactory," or words of like import, shall mean approved by, acceptable or satisfactory to, the applicable Director or the Engineer, unless the context show that another meaning is plainly intended.

G.3 SPECIFICATIONS AND DRAWINGS. The specifications and drawings are intended to cover all of the work that is known to be required to effect a complete installation. They are intended to be mutually explanatory of each other, but should any discrepancy or inconsistency appear or any misunderstanding arise as to the import of anything contained in either the specifications or the drawings, the interpretation of the doubtful portions will be made by the Engineer, whose decision shall, in all cases, be final and binding on the Contractor.

Any materials or workmanship obviously necessary to satisfactory completion shall be furnished and installed whether or not specifically shown or mentioned. Any corrections of errors or omissions in the specifications or drawings, or both, may be made by the Engineer when such correction is necessary for the proper fulfillment of their intention as determined by him/her. Figures shall have preference over scale in reading dimensions. Copies of the specifications and drawings shall be kept constantly at the work. Any supplementary or detail drawings which may be made by the Engineer subsequent to the date of this contract, relating to the work herein contemplated, as showing more particularly the details of the work to be done, or specifications and the drawings furnished by the Contractor and approved by the Engineer, are, and are to be held to be, controlling parts of this contract insofar as they do not conflict with other provisions of the contract.

If the Contractor, in the course of the work, finds any discrepancy between the plans and the physical conditions of the locality, or any errors or omissions in the plans or in the layout as given by the points and instructions furnished by the Engineer, it shall be his duty to inform the Engineer, in writing, and the Engineer shall promptly verify the same. Any work done after such discovery, until authorized, will be done at the Contractor's risk.

G.4 ENGINEER TO DECIDE. All work under this contract shall be done in a manner acceptable to the Engineer, who shall determine the amount, quality, acceptability and fitness of the several kinds of work and material which are to be paid for hereunder, and shall decide all questions which may arise as to measurements of quantities and the fulfillment of the conditions of this contract on the part of the Contractor.

G.5 WORK TO BE DONE IN ACCORDANCE WITH SPECIFICATIONS AND DRAWINGS. The work at all stages of its completion must conform with the specifications and drawings and with the lines and grades and other instructions of the Engineer, as given from time to time during the progress of the work. In no case will any work in excess of the requirements of the drawings as interpreted by the Engineer be paid for unless authorized in writing by the Engineer.

G.6 RIGHT TO MAKE CHANGES IS RESERVED. The City reserves the right to make alterations in the location, lines, grade, plan, form dimensions, numbers or materials of the work herein contemplated, either before or after the commencement of construction. If such alterations diminish the amount of work to be done, they shall not form the basis for a claim for damage or for loss of anticipated profits from the work which may be dispensed with; if they increase the amount of work, such increase shall be paid for according to the quantity of work actually done and at prices stipulated for such work under this contract. All work actually done under a unit price (where applicable) contract, whether more or less than the quantity estimated or specified, shall be paid for by the determined units, on the basis of the bid per unit in the proposal.

G.7 EXTENSION OF TIME. If the Contractor is delayed at any time in the progress of the work by any act or neglect of the City, or by City employees, or by any other contractor employed by the City, or by changes ordered in the work, or by strikes, lockouts, fire, unusual delay in transportation, unavoidable casualties or any causes beyond the Contractor's control, or by any cause which the Engineer shall decide to justify the delay, then the time of completion

shall be extended for such reasonable time as the Engineer may decide subject to the approval of the applicable Director.

No such extension shall be made for delay due to rejection of defective materials or workmanship or for any delay occurring more than seven (7) days before claim therefore is made in writing to the Engineer. In the case of a continuing cause of delay, only one claim is necessary.

If no schedule or agreement stating dates upon which drawings shall be furnished is made, then no claim for delay shall be allowed because of any delay in the furnishing of drawings to the Contractor.

G.8 ADEQUATE PLANT AND METHODS. The Contractor shall furnish such construction plant and use such methods and appliances as will secure a satisfactory quality of work and a rate of progress which will insure the completion of the work within the time specified. Before starting the installation of the construction plant, the Contractor shall submit to the Engineer, for approval, a plan showing the general arrangement of the plant to be installed and the proposed facilities for storage of materials and equipment. If at any time the plant or any portion of it shall appear to the Engineer to be, or likely to become, inadequate, incomplete, faulty or unsafe, the Contractor shall promptly obey the orders of the Engineer to supplement or to remove or replace the same; but the failure of the Engineer to issue such orders shall not relieve the Contractor of his responsibility for the efficiency, adequacy and safe operation of the plant.

He shall cover and protect his work from damage, and all injury to the same, before completion of the contract.

He shall be financially responsible for all damage to the party of the first part or its property, to other contractors, to the neighboring premises, or to any private or personal property, for any cause whatsoever, during the period of the contract.

G.9 WORKERS. The Contractor shall employ only competent and skillful employees to do the work, and whenever the Engineer shall notify the Contractor, in writing, that any person on the work is, in his/her opinion, incompetent, unfaithful or disorderly, uses threatening or abusive language to any official having supervision of the work, or is in any other way unsatisfactory, such person shall be discharged from the work and shall not again be employed on it except with the consent of the Engineer.

Neither party shall employ or hire any employee of the other party without the latter's consent.

G.10 WAGES. All employees directly employed on this work shall be paid wages which shall in no event be less than the minimum hourly wage rates for skilled, semi-skilled, and unskilled labor prescribed by the Council of the City of Reading, in accordance with Bill No. 33 and/or the Commonwealth of PA Prevailing Wage Act, P.L. 987 as may be amended.

G.11 PENALTY FOR FAILURE TO LIVE UP TO MINIMUM WAGE CONTRACT. A penalty shall be exacted from the Contractor in an amount equal to twice the difference between the minimum wage contained in the prescribed wage rates, and the wage actually paid to each

laborer or mechanic for each day during which he has been employed at a wage less than that prescribed.

G.12 INSPECTORS TO REPORT VIOLATIONS. Every person assigned as an Inspector of the work to be performed under this contract, in order to aid in enforcing the fulfillment of the minimum wage requirements thereof, shall, upon observation or investigation, report to the applicable Director, all violations of minimum wage stipulations, together with the name of each laborer or mechanic who has been paid a wage less than that prescribed, and the day or days of such violation.

G.13 PENALTIES TO BE WITHHELD FROM MONEYS DUE THE CONTRACTOR.
All minimum wage violation penalties shall be withheld and deducted for the use of the City from any moneys due the Contractor by the City; provided, that if the Contractor subsequently pays to all laborers and mechanics the balance of the amounts stipulated as minimum wages, the City shall pay to the Contractor the amounts so withheld.

G.14 CONTRACTOR'S RESPONSIBILITY FOR EMPLOYEES. The Contractor
hereby assumes all responsibility for himself/herself, his/her agents and employees growing out of connection with the execution of the work called for by this contract, for the violation of, City ordinances and the laws governing contract work in the Commonwealth of Pennsylvania. The Contractor further agrees to hold the City of Reading harmless from all responsibility for employees on this work under the Workmen's Compensation Act of the Commonwealth of Pennsylvania, and to carry insurance on his/her employees, as provided thereby.

G.15 CONTRACTOR REPRESENTED ON THE WORK. The Contractor shall give personal attention constantly to the faithful prosecution of the work and shall be present, either in person or by a competent superintendent, on the site of the work, continuously during its progress. Such representative shall have authority to receive and to act without delay upon all instructions of the Engineer or assistants in the prosecution of the work in conformity with the contract.

Insofar as it is practicable, all orders given by the Engineer to the Contractor shall be in writing. In those cases where orders are given orally they shall be confirmed in writing. Orders or directions, written or oral, from the Engineer, delivered to the Contractor's office shall be considered as delivered to the Contractor.

G.16 REPRESENTATIVE MUST BE PRESENT. In case the Engineer or a representative may at any time have occasion to give directions regarding the work for the reason that the same is not, in the Engineer's opinion, being carried out in accordance with the provisions of this contract, and should there be no responsible representative of the Contractor on the ground empowered to receive such instructions, the Engineer or a representative shall order that particular portion of the work to be stopped until such representative of the Contractor appears and receives instructions. It is hereby agreed that suspensions of the work for such cause shall not entitle the Contractor to claims for damage of any kind, nor to an extension of the time in which to complete the work to be done under this contract.

G.17 LEGAL ADDRESS OF CONTRACTOR. The address given in the bid or proposal upon which this contract is based is hereby designated as the legal address where all notices, letters

and other communications to the Contractor shall be mailed or delivered prior to the beginning of the work provided for in this contract. The delivery at the above-named place, or depositing in a post-paid wrapper directed to the above place, in any post office box regularly maintained by the post office, of any notice, letter or other communication to the Contractor, shall be deemed sufficient service thereof upon the Contractor and the date of said service shall be the date of such delivery or mailing.

G.18 CHANGE IN ADDRESS. Such address may be changed at any time
by an instrument in writing executed and acknowledged by the Contractor and delivered to the City. Nothing herein contained shall be deemed to preclude or render inoperative the service of any notice, letter or other communication upon the Contractor personally.

G.19 LAWS, ORDINANCES AND REGULATIONS. The Contractor shall be fully informed as to all laws, ordinances and regulations in any manner affecting those engaged or employed in the work, or the materials used in the work, or in any way affecting the conduct of the work, and of all orders and decrees of bodies or tribunals having any jurisdiction over the same, if any discrepancy or inconsistency shall be discovered in this contract, specifications or drawings, in relation to any such law, ordinance, population, order or decree, the contractor shall immediately report the same in writing to the Engineer. At all times the Contractor shall observe and comply with all laws, ordinances, regulations, orders and decrees which may be in effect during the progress of this contract; and shall indemnify and save harmless the City and its officers and employees against any claim or liability arising from the violation of any legal requirement in the prosecution of this contract.

G.20 INDEMNIFICATION OF CITY. In case any action at law, proceeding in eminent domain, or suit in equity may or shall be brought against the party of the first part, or any of its offices or agents, for or on account of the failure, omission or neglect of the Contractor or the subcontractors, his/her or their employees or agents, to do and perform any of the covenants acts, matters, or things by this contract undertaken to be done or performed by the Contractor or subcontractors, his/her or their employees or agents, or for any injury or damage caused by the negligence of the Contractor or subcontractors, his/her or their employees or agents, or for damage or injury for which the Contractor undertakes responsibility under the provisions of this contract, the Contractor shall immediately assume and take charge of the defense to such actions, proceedings or suits in like manner and to all intents and purposes, as if said actions, proceedings or suits had been brought directly against the Contractor; and the Contractor shall also indemnify and save harmless the party of the first part, its officers and agents, of and from all loss, cost or damage whatever arising out of such actions, proceedings or suits as may or shall be brought as aforesaid.

G.21 SUITS AND CLAIMS. The Contractor agrees to indemnify and save harmless the City of Reading, the applicable Director, the Engineer, and their assistants, from all suits or actions of every name and description, either in law or in equity, including proceedings in eminent domain for the recovery of consequential damages, or for or on account of use of patented appliance, brought against them or either of them, or for any damage or injuries received or sustained by any party or parties, person or persons, natural or artificial, either in the performance or as a result of the work under this agreement, regardless of whether such suits, actions or proceedings brought are based or grounded upon negligence of the Contractor, the subcontractors, or his/her

or their agents, servants or employees. The Contractor further agrees that all or as much of the monies due under this agreement as shall be or may be considered necessary by the applicable Director, shall or may be retained, without any liability of the City to the Contractor, for interest thereon because of the retention thereof, until all such suits, proceedings or claims have been settled or terminated, and satisfactory evidence to that effect furnished to the applicable Director, provided however, that no such monies shall be retained by the City after six (6) years following the completion and acceptance of the work under the contract, excepting for or on account of claims filed or suits or proceedings begun before the expiration of the applicable statute of limitations.

G.22 RESPONSIBILITY FOR INJURY. The Contractor shall assume all responsibility for loss, damage or injury to persons or property arising out of the nature of the work, from the actions of the elements, or from any unforeseen or unusual difficulties over which the City has no control, in addition to and without limiting the Contractor's liability under the other provisions of the contract.

G.23 CONTRACTOR'S CLAIMS FOR DAMAGE. If the Contractor claims compensation for any damage alleged to have been sustained by reason of any act or omission on the part of the City or any of its agents, he shall, within one (1) week after the sustaining of such damage, make a written statement to the Engineer of the nature of the damage sustained, and shall, on or before the fifteenth (15th) day of the month succeeding that in which any such damage shall have been sustained, file with the Engineer an itemized statement of the details and amounts of such damage, and unless such statement shall be made as so required, the claim for compensation shall be forfeited and invalid, and the Contractor shall not be entitled to payment on account of any such damage.

G.24 LINES AND GRADES. All lines and grades will be given by the Engineer, but the Contractor shall provide such material and give such assistance therefore as may be required by the Engineer, and the marks so given shall be carefully preserved. The Contractor shall keep the Engineer informed, a reasonable time in advance, of the time and places a which he/she intends to work, in order that lines and grades may be furnished and necessary measurements for record and payment made with the minimum inconvenience to the Engineer or delay to the Contractor. No claim for extra payment will be allowed for the cost to the Contractor of any material, work or delay occasioned by giving lines and grades, or making necessary measurements or inspections, as all such cost shall be considered to have been included in the price bid for the work.

G.25 INSPECTION. The Engineer will appoint such person or persons as may be deemed necessary to inspect properly the materials furnished and the work done under this contract, and to see that the same correspond strictly with these specifications. Such materials and workmanship shall always be subject to the approval of the Engineer, but no inspection, approval or acceptance of any part of the work herein contracted for or of the materials used therein, nor any payment on account thereof, shall prevent the rejection of said work or materials at any time thereafter during the existence of this contract, should said work or materials be found to be defective, or not in accordance with the requirements of the contract.

The Contractor shall permit, or secure permission for the Engineer or a duly authorized Inspector

or representative to enter any manufactory, shop or other place where any material for, or part of the work is being prepared, manufactured or constructed, at any time when such work is in progress. The Contractor shall furnish and prepare, or cause to be furnished or prepared, without charge, all such assistance, appliances, samples of materials and test specimens as may be ordered by the Engineer or such Inspector or representative for the purpose of making official tests and investigations. The Engineer shall be notified of the time and place of preparation, manufacture or construction of any material for, or part of the work which he/she may wish to inspect before delivery at the site of the work. Such notification shall be give a sufficient time in advance of the beginning of the work on such material or part to allow arrangements to be made for inspection and testing.

G.26 NIGHT WORK. No night work, except for the inspection of lighting, requiring the presence of the Engineer or Inspector will be permitted except in case of emergency, and then only with the written consent of the Engineer and to such an extent as may be judged necessary.

G.27 SUNDAY WORK. No Sunday work will be permitted, except in case of great emergency, and then only with the written consent of the Engineer, and to such extent as is absolutely necessary.

G.28 NO WORK IN BAD WEATHER. No work shall be done under this contract when, in the opinion of the Engineer, the weather is unsuitable for good and careful work to be performed. No concrete work shall be done on days on which the temperature falls below 25 degrees Fahrenheit. Should the severity of the weather continue such that the work cannot be prosecuted successfully, the Contractor, upon order of the Engineer, shall cease all such work until directed to resume the same. In the latter case, suitable extension of time shall be allowed to compensate for time actually lost as provided for in Article G.7.

G.29. NOT TO SUBLET OR ASSIGN. The Contractor shall give personal attention constantly to the faithful prosecution of the work and shall not assign, transfer, convey, sublet or otherwise dispose of this contract, or his/her title, right or interest in or to the same or any part thereof, nor shall the Contractor assign, by power of attorney or otherwise, any of the monies due or to become due, nor issue any order or orders or drafts on the Controller or Treasurer of the City of Reading for any monies due or to become due under this contract, unless by and with the consent of the City first duly had and obtained by resolution entered upon the minutes of said City.

G.30 RIGHT OF PROPERTY IN MATERIALS. Nothing in this contract shall be considered as vesting in the Contractor any right of property in materials used, after they shall have been attached to or incorporated in the work, nor in materials which have been estimated for partial payment, but all such materials, upon being so attached, incorporated or estimated, shall become the property of the City.

G.31 DEFECTIVE MATERIALS AND WORKMANSHIP. No materials of any kind shall be used until they have been examined and approved by the Engineer, who shall have full power to condemn any work and materials not in accordance with the specifications, and to require the Contractor to remove any work or materials so condemned. Inspections of the work shall not relieve the Contractor from any of his/her obligations to fulfill the contract as herein described, and defective work shall be made good, and unsuitable materials may be rejected,

notwithstanding that such work or materials may have been previously overlooked by the Engineer and accepted or estimated for payment if the work or any part thereof shall be found defective at any time before the final acceptance of the whole work, the Contractor shall immediately make good such defect in a manner satisfactory to the Engineer, and if any material brought upon the ground for use in the work shall be condemned by the Engineer as unsuitable or not in conformity with the drawings or specifications, the Contractor shall forthwith remove such materials from the vicinity of the work. If the Contractor shall fail to remove or replace any defective or damaged materials or work after reasonable notice, the Engineer may cause such material or work to be removed or replaced, and the expense thereof shall be borne by the Contractor.

G.32 RESPONSIBILITY FOR WORK. The Contractor shall be held responsible for any or all materials or work to the full amount of all payments made thereon, and shall be required to make good, at his/her own cost, any injury or damage which said materials or work may have sustained from any source or cause whatever before its final acceptance.

G.33 CONDITIONS UNDER WHICH CITY MAY COMPLETE WORK. If the work to be done under this contract shall be neglected or abandoned, or the contract or any claim thereunder shall be assigned by the Contractor otherwise than as herein specified, or if at any time the Engineer shall be of the opinion, and shall so certify in writing to the City's representative, that the rate of progress is insufficient or that the work, or any part thereof, is unnecessarily or unreasonably delayed, or that the Contractor is violating any of the provisions of this contract or carelessly executing any portion of the work, the City may notify the Contractor and surety in writing to fulfill the conditions of the Contract; and should the Contractor or the surety fail to comply with said notice within ten (10) days, the City may notify the Contractor and the surety to discontinue all work, or any part thereof; and thereupon the Contractor and the surety shall discontinue said work, or said part thereof as the City may designate; and the City may thereupon, by contract or otherwise, as it may determine, complete the work or such part thereof, and charge the expenses thereof to the Contractor or the surety; and may take possession of and use therein such materials, animals, machinery, equipment, implements and tools of every description as may be found upon the work. The expense so incurred shall be deducted and paid by the City out of any monies then due or to become due the Contractor under this contract; or any part thereof; and in case such expense is less than the sum which would have been payable under this contract if the same had been completed by the Contractor, the Contractor shall be entitled to receive the difference, and in case such expense shall exceed the latter sum, the Contractor or the surety shall pay the amount of such excess to the party of the first part.

G.34 ALL PARTS OF WORK COVERED. The Contractor further agrees that the following clauses relative to the construction of the work shall apply to each and all of the separate parts of the work, as though specially mentioned under the different headings in the specifications:

Delivery of Materials - The Contractor shall be entirely responsible for delivery of all materials to the site of the work, making the arrangements therefore.

Engineer Shall Measure - No work shall be covered over or filled in until it shall have been inspected by the Engineer.

Materials Properly Stored - The materials to be used in construction shall be protected from deterioration and damage, and shall be so disposed of as not to endanger the work and in such manner that full access may be had at all times to all work under construction or completed.

Surplus Materials Removed - All parts of the work shall be kept in as neat and orderly condition as circumstances will permit and upon completion of the work, all surplus materials, earth, sand, rubbish and refuse of every kind, and all tools, machinery, equipment and other materials belonging to the Contractor shall be removed from the construction works and adjoining premises so as to leave everything in an acceptable condition, within a week after receipt of final certificate.

G.35 ESTIMATED QUANTITIES APPROXIMATE. In unit price contracts, the quantities of the various classes of work to be done and materials to be furnished under this contract, as estimated by the Engineer and listed in Specifications, attached hereto, are approximate and only for the purpose of comparing, on a uniform basis, the bids offered for the work under this contract; and neither the City nor the Council nor any member of the Council of the City of Reading is to be held responsible if any of the said estimated quantities shall be found to be not even approximately correct in the construction of the work; and the Contractor shall make no claim for damages on anticipated profits or loss of profit, because of a difference between the quantities of the various items of work actually done or materials actually furnished and the estimated quantities stated in the Specifications, or because of the entire omission of any of the quantities or items stated in the Specifications.

G.36 EXTRA WORK. The Contractor shall do any work not herein otherwise provided for which, in the opinion of the Engineer, is necessary for the proper completion of the work, but not such work will be allowed or paid for except on a written order of the Engineer, and there shall be no claim for extra work or materials or for damage sustained except under this Article. The extra work order issued by the Engineer shall specify the basis of payment for the extra work. Any extra work or changes in the work involving changes in the plans and/or specifications shall be approved by the applicable Director, prior to the execution of the work.

G.37 MONTHLY ESTIMATES. Current payments for work done under this contract will be made as follows: on invoices submitted by the Contractor and approved by the Engineer or Architect. Ten percent (10%) of each General Contractor invoice request shall be retained by the City on this contract until it is completed up to City codes and contract specifications and approved by a City Official or person representing a City Official Architect or Engineer.

It is further agreed and understood that inclusion of any portion of the work in the monthly estimate shall not be construed as final approval or acceptance of the same.

G.38 CONTRACTOR SHALL PREPARE FOR FINAL INSPECTION. Upon the completion of the work the Contractor shall tear down and remove all temporary buildings and structures built by the Contractor, remove and thoroughly clear away all debris, forms and surplus materials and leave the site of the work in a neat and satisfactory condition, and shall notify the Engineer when the work is ready for final inspection.

G.39 WORK TO BE PROPERLY PERFORMED. It is expressly understood that acceptance of

work and materials during construction will not imply final acceptance of the work, if the final inspection shall disclose faulty workmanship or materials; and all work of whatever kind that, during its progress and before it is finally accepted, may become damaged from any cause, shall be repaired in a manner satisfactory to the Engineer or, if necessary, shall be broken up and removed and replaced with good and satisfactory work by the Contractor at his own expense. All work of every description shall be the best of its respective kind; and everything not particularly specified herein shall be done and finished in the best manner, and as is usual in first-class work of the several kinds.

Failure or neglect on the part of the Engineer, or any authorized agents to condemn or reject any bad or inferior work or materials shall not be construed to imply an acceptance of such work or materials, if such bad or inferior materials or work becomes evident at any time prior to the final acceptance of the work and the release of the Contractor by the Council of the City of Reading; nor shall it be construed as barring the City of Reading at any subsequent time from the recovery for damages of such sum of money as may be needed to build a new all portions of the work in which fraud was practiced or improper materials hidden, whenever found.

G.40 ACCEPTANCE AND FINAL PAYMENT. Upon receipt of written notice that the work is ready for final inspection and acceptance, the Engineer or Architect shall promptly make such inspection, and when he/she finds the work acceptable under the contract fully performed he/she shall promptly issue a final certificate, over his/her own signature, stating that the work provided for in this contract has been completed and is accepted under the terms and conditions thereof, and the entire balance found to be due the Contractor, including the retained percentage, shall be paid to the Contractor within (30) days after the execution of said final certificate.

G.41 WAIVER. Neither acceptance by the City, or any of its officers or employees, nor any order, measurement or certificate by the Engineer, nor any order by the City Council for payment of money, nor any payment for, nor any extension of time, nor any possession taken by the City or its officers or employees, shall operate as a waiver of any portion of this contract or of any power herein reserved to the City, or of any right to damage herein provided; nor shall any waiver of any breach of this contract be held to be a waiver of any other or subsequent breach. All remedies provided in this contract shall be taken and construed as cumulative; that is, in addition to each and every other remedy herein provided.

G.42 ACCEPTANCE OF FINAL CERTIFICATE. The acceptance by the Contractor of payment of the final estimate shall be conclusive evidence of acceptance and approval of estimates, accounting and deductions, and of full payment by the City for all work, labor, materials and services done or furnished hereunder, and of full satisfaction, discharge, release and waiver of all claims and demand of; or on behalf of the Contractor against the City, arising out of this agreement and the execution thereof. It is hereby further agreed that the Contractor shall not be entitled to demand or receive payment except in the manner set forth in this contract; and the Contractor further agrees that the final payment of the amount due under this contract and payment of the bills rendered for work done and materials furnished in accordance with any alterations of the same, shall release the City of Reading from any and all claims and liabilities on account of the work performed and materials furnished under said contract, or any alteration thereof.

G.43 MAINTENANCE AFTER COMPLETION. The Performance Bond shall remain in force for one (1) year from the date of completion and acceptance of the work under this contract, as security against any and all damage which may result from defects of materials or workmanship which may become apparent prior to the expiration of the one-year maintenance period. During this period the Contractor shall, promptly upon notification from the Engineer, repair all breaks and failures due to defects of material or workmanship at his own expense. If the Engineer shall deem it necessary and shall so direct, such repairs shall be made within twenty-four (24) hours after service of notice. If the Contractor unnecessarily delays making repairs ordered, or if delay would cause serious loss or damage, the City may undertake to have such repairs made or defects repaired without previous notice, and the expense of such repairs shall be borne by the Contractor or the surety. The Contractor shall be responsible for any damage resulting to any person or property from any violation of the guarantee and from unnecessary delays in making repairs.

G.44 PRICES. The City agrees to pay, and the Contractor agrees to receive, the price specified in the proposal submitted, as full compensation for furnishing all the materials called for, and for all labor and use of all machinery, equipment and tools necessary for executing the work contemplated in this contract; for all royalties, for patents and patented materials, appliances and processes; also for all loss or damage arising out of the nature of the work, or from the action of the elements, or from any unforeseen reasons, obstructions or difficulties which may be encountered in the prosecution of the work, for all risks of every description connected with the work, and for all expenses incurred by or in consequence of the suspension of discontinuance of said work as herein specified, and for well and faithfully completing the work, and the whole thereof, according to the specifications and drawings and the requirements of the Engineer under them.

G.45 NO EXTRA COMPENSATION. The Contractor further agrees not to ask, demand, sue for, or recover for any extra compensation, for any materials furnished or work done under this contract, beyond the amounts payable for the several classes of work or kinds of materials herein enumerated, which shall be actually performed and furnished at the prices therefore herein agreed upon and fixed.

G.46 CONTRACTOR TO TAKE OUT ALL PERMITS. The Contractor shall take out all necessary permits required by agencies of the City of Reading and/or all other governmental agencies; shall give all notices required by law or ordinances; shall pay all fees and charges incident to the due and lawful prosecution of the work covered by the contract, and shall comply with all laws and regulations relating to buildings and public highways. All permits shall be at his expense.

G.47 NO CLAIM FOR EXTRA WORK. No claim for extra work or material shall be allowed to the Contractor, unless before the performance of all such extra work the applicable Director shall have first authorized the same in writing, and the price or prices to be paid therefore shall first have been agreed upon in writing between the Director and the Contractor, and the same shall have been done or furnished under a written order from the Director given before the performance of such extra work or the furnishing of such extra materials. All claims for extra work or materials in any month shall be made to the Director in writing before the fifteenth (15th) day of the following month, and failing to make such claim within the time required, the

right of the Contractor to extra pay for such extra work or materials shall be deemed to have been waived and forfeited.

G.48 WORK TO BE DONE TO THE SATISFACTION OF THE CITY ENGINEER. All the work under this contract shall be done to the satisfaction of the City Engineer, who shall in all cases determine the amount, quality, acceptability and fitness of the several amounts of work and materials which are to be paid for hereunder and shall decide all questions which may arise as to the measurement of quantities in the fulfillment of this contract on the part of the Contractor, and shall determine all questions respecting the true construction or meaning of the plans and specifications, and the determination and decision thereon shall be final and conclusive; and such determination and decision, in case any question shall arise, shall be a condition precedent to the right of the Contractor to receive any money hereunder.

G.49 ENGINEER TO INSPECT AND REJECT. The Engineer shall inspect
the materials furnished and the work done, and see that the same strictly correspond to the specifications, and he shall at all times have free access to the works, storehouse and yard of the Contractor, and shall be privileged to take such samples therefrom as he may deem necessary; and if the work, or any material brought on the grounds for the use of the work, or selected for the same, shall be condemned by the Engineer, as unsuitable or not in conformity with the specifications, the Contractor shall forthwith remove such materials from the work.

Before issuance of the final certificate the Contractor shall furnish evidence satisfactory to the Engineer that all payrolls, materials, bills and other indebtedness connected with the work have been paid.

It is understood and agreed by the parties hereto that the final estimate of the Engineer shall be evidence of the amount of work performed by the Contractor under and by virtue of this agreement, and shall be taken as the full measure of the compensation to be received by the Contractor. The aforesaid estimate shall be based upon the contract price for the furnishing of all the different materials and labor, and the performance of all the work mentioned in this contract, including the specifications, and where there may be any ambiguity therein, the Engineer's instructions shall be considered explanatory and the decision shall be final.

No inspection, approval or acceptance of any of the work herein contracted for, or of the materials used herein, or any payment on account thereof shall prevent the party of the first part from objecting to the acceptance of said work or materials at any time during the existence of this contract. Neither the inspection of the applicable Director, or Division Head, or the City Engineer or any of their employees nor any order, measurement or certificate by the City Engineer nor any order by the Director for the payment of money, nor any payment for, or acceptance of, the whole or any part of the work, by the Director of the Division of Planning, nor any extension of time, nor any possession taken by the Director or his employees, shall operate as a waiver of any provision of this contract, or any power herein reserved to the party of the first part, or of any right to damage herein provided; nor shall any waiver of any breach of this contract be held to be a waiver of any other subsequent breach.

Any remedy provided in this contract shall be taken and construed as cumulative; that is, in addition to each and every other remedy herein provided; and in addition to all other suits,

actions or legal proceedings the party of the first part shall be entitled to as of right.

G.50 CONTRACTOR NOT TO DISCOMMODE PRIVATE COMPANIES. The Contractor shall afford while the work is underway, the necessary facilities to any and all companies owning railway tracks, pipes, subway ducts, or other surface, sub-surface or super-surface construction on the line of the work, in the preservation of the same from injury, all without charge therefore the expense to the City.

G.51 EXAMINATIONS. At any time before or after completion of the work, should the City Engineer require it, the Contractor shall make such openings, and to such extent, through such part or parts of the work, as the City Engineer may direct, and shall restore the work so distributed to the satisfaction of the City Engineer; and should the work, in the opinion of the City Engineer, whose decision shall be final and conclusive therein, be found faulty in any respect, the whole of the expense incurred thereby shall be defrayed by the Contractor, according to and upon the prices herein set forth, but if otherwise, by the City.

TECHNICAL SPECIFICATIONS

SECTION 033000 - CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including Instructions to Bidders, Introduction, General Conditions, and Scope of Work Sections, apply to this Section.

1.2 SUMMARY

A. This Section specifies cast-in place concrete, including formwork, reinforcement, concrete materials, mixture design, placement procedures, and finishes.

1.3 DEFINITIONS

A. Cementitious Materials: Portland cement alone or in combination with one or more of the following: blended hydraulic cement, fly ash and other pozzolans, ground granulated blast-furnace slag, and silica fume; subject to compliance with requirements.

1.4 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Design Mixtures: For each concrete mixture. Submit alternate design mixtures when characteristics of materials, Project conditions, weather, test results, or other circumstances warrant adjustments.

1. Indicate amounts of mixing water to be withheld for later addition at Project site.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: A qualified installer who employs on Project personnel qualified as ACI-certified Flatwork Technician and Finisher and a supervisor who is an ACI-certified Concrete Flatwork Technician.

B. Manufacturer Qualifications: A firm experienced in manufacturing ready-mixed concrete products and that complies with ASTM C 94/C 94M requirements for production facilities and equipment.

1. Manufacturer certified according to NRMCA's "Certification of Ready Mixed Concrete Production Facilities."

1.6 DELIVERY, STORAGE, AND HANDLING

A. Steel Reinforcement: Deliver, store, and handle steel reinforcement to prevent bending and damage.

PART 2 - PRODUCTS

2.1 FORM-FACING MATERIALS

A. Smooth-Formed Finished Concrete: Form-facing panels that will provide continuous, true, and smooth concrete surfaces. Furnish in largest practicable sizes to minimize number of joints.

1. Plywood, metal, or other approved panel materials.
2. Exterior-grade plywood panels, suitable for concrete forms, complying with DOC PS 1, and as follows:

a. High-density overlay, Class 1 or better.
b. Medium-density overlay, Class 1 or better; mill-release agent treated and edge sealed.
c. Structural 1, B-B or better; mill oiled and edge sealed.
d. B-B (Concrete Form), Class 1 or better; mill oiled and edge sealed.

B. Chamfer Strips: Wood, metal, PVC, or rubber strips, 3/4 by 3/4 inch, minimum.

C. Form-Release Agent: Commercially formulated form-release agent that will not bond with, stain, or adversely affect concrete surfaces and will not impair subsequent treatments of concrete surfaces.

1. Formulate form-release agent with rust inhibitor for steel form-facing materials.

D. Form Ties: Factory-fabricated, removable or snap-off metal or glass-fiber-reinforced plastic form ties designed to resist lateral pressure of fresh concrete on forms and to prevent spalling of concrete on removal.
1. Furnish ties that, when removed, will leave holes no larger than 1 inch in diameter in concrete surface.

2.2 STEEL REINFORCEMENT

A. Reinforcing Bars: ASTM A 615/A 615M, Grade 60, deformed.

B. Plain-Steel Wire: ASTM A 82.

2.3 CONCRETE MATERIALS

A. Cementitious Material: Use the following cementitious materials, of the same type, brand, and source, throughout Project:

1. Portland Cement: ASTM C 150, Type I/II gray**.**

B. Normal-Weight Aggregates: ASTM C 33, coarse aggregate or better, graded.

1. Maximum Coarse-Aggregate Size: 3/4 inch nominal.
2. Fine Aggregate: Free of materials with deleterious reactivity to alkali in cement.

C. Lightweight Aggregate: ASTM C 330.

D. Water: ASTM C 94.

2.4 ADMIXTURES

A. Air-Entraining Admixture: ASTM C 260.

B. Chemical Admixtures: Provide admixtures certified by manufacturer to be compatible with other admixtures and that will not contribute water-soluble chloride ions exceeding those permitted in hardened concrete. Do not use calcium chloride or admixtures containing calcium chloride.

1. Water-Reducing Admixture: ASTM C 494, Type A.
2. Retarding Admixture: ASTM C 494, Type B.
3. Water-Reducing and Retarding Admixture: ASTM C 494, Type D.
4. High-Range, Water-Reducing Admixture: ASTM C 494, Type F.
5. High-Range, Water-Reducing and Retarding Admixture: ASTM C 494, Type G.
6. Plasticizing and Retarding Admixture: ASTM C 1017, Type II.

2.5 RELATED MATERIALS

A. Expansion- and Isolation-Joint-Filler Strips: ASTM D 1751, asphalt-saturated cellulosic fiber or ASTM D 1752, cork or self-expanding cork.

2.6 CONCRETE MIXTURES, GENERAL

A. Prepare design mixtures for each type and strength of concrete, proportioned on the basis of laboratory trial mixture or field test data, or both, according to ACI 301.

B. Limit water-soluble, chloride-ion content in hardened concrete to 0.15 percent by weight of cement.

C. Admixtures: Use admixtures according to manufacturer's written instructions.

1. Use water-reducing or high-range water-reducing admixture in concrete, as required, for placement and workability.
2. Use water-reducing and retarding admixture when required by high temperatures, low humidity, or other adverse placement conditions.
3. Use water-reducing admixture in pumped concrete, concrete for heavy-use industrial slabs and parking structure slabs, concrete required to be watertight, and concrete with a water-cementitious materials ratio below 0.50.
4. Use corrosion-inhibiting admixture in concrete mixtures where indicated.

2.7 CONCRETE MIXTURES FOR BUILDING ELEMENTS

A. Slabs-on-Grade: Proportion normal-weight concrete mixture as follows:

1. Minimum Compressive Strength: 4000 psi.
2. Minimum Cementitious Materials Content: 520 lb/cu. yd.
3. Slump Limit: 4 inches.

2.8 FABRICATING REINFORCEMENT

A. Fabricate steel reinforcement according to CRSI's "Manual of Standard Practice."

2.9 CONCRETE MIXING

A. Ready-Mixed Concrete: Measure, batch, mix, and deliver concrete according to ASTM C 94/C 94M, and furnish batch ticket information.

1. When air temperature is between 85 and 90 deg F, reduce mixing and delivery time from 1-1/2 hours to 75 minutes; when air temperature is above 90 deg F, reduce mixing and delivery time to 60 minutes.

PART 3 - EXECUTION

3.1 FORMWORK

A. Design, erect, shore, brace, and maintain formwork, according to ACI 301, to support vertical, lateral, static, and dynamic loads, and construction loads that might be applied, until structure can support such loads.

B. Construct formwork so concrete members and structures are of size, shape, alignment, elevation, and position indicated, within tolerance limits of ACI 117.

C. Limit concrete surface irregularities, designated by ACI 347R as abrupt or gradual, as follows:

1. Class A, 1/8 inch for smooth-formed finished surfaces.

D. Construct forms tight enough to prevent loss of concrete mortar.

E. Fabricate forms for easy removal without hammering or prying against concrete surfaces. Provide crush or wrecking plates where stripping may damage cast concrete surfaces. Provide top forms for inclined surfaces steeper than 1.5 horizontal to 1 vertical.

1. Install keyways, reglets, recesses, and the like, for easy removal.
2. Do not use rust-stained steel form-facing material.

F. Set edge forms, bulkheads, and intermediate screed strips for slabs to achieve required elevations and slopes in finished concrete surfaces. Provide and secure units to support screed strips; use strike-off templates or compacting-type screeds.

G. Provide temporary openings for cleanouts and inspection ports where interior area of formwork is inaccessible. Close openings with panels tightly fitted to forms and securely braced to prevent loss of concrete mortar. Locate temporary openings in forms at inconspicuous locations.

H. Chamfer exterior corners and edges of permanently exposed concrete.

I. Form openings, chases, offsets, sinkages, keyways, reglets, blocking, screeds, and bulkheads required in the Work. Determine sizes and locations from trades providing such items.

J. Clean forms and adjacent surfaces to receive concrete. Remove chips, wood, sawdust, dirt, and other debris just before placing concrete.

K. Retighten forms and bracing before placing concrete, as required, to prevent mortar leaks and maintain proper alignment.

L. Coat contact surfaces of forms with form-release agent, according to manufacturer's written instructions, before placing reinforcement.

3.2 EMBEDDED ITEMS

A. Place and secure anchorage devices and other embedded items required for adjoining work that is attached to or supported by cast-in-place concrete. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.

1. Install anchor rods, accurately located, to elevations required.
2. Install dovetail anchor slots in concrete structures as indicated.

3.3 REMOVING AND REUSING FORMS

A. General: Formwork for sides of beams, walls, columns, and similar parts of the Work that does not support weight of concrete may be removed after cumulatively curing at not less than 50 deg F for 24 hours after placing concrete, if concrete is hard enough to not be damaged by form-removal operations and curing and protection operations are maintained.

1. Leave formwork for beam soffits, joists, slabs, and other structural elements that supports weight of concrete in place until concrete has achieved at least 70 percent of its 28-day design compressive strength.
2. Remove forms only if shores have been arranged to permit removal of forms without loosening or disturbing shores.

B. Clean and repair surfaces of forms to be reused in the Work. Split, frayed, delaminated, or otherwise damaged form-facing material will not be acceptable for exposed surfaces. Apply new form-release agent.

C. When forms are reused, clean surfaces, remove fins and laitance, and tighten to close joints. Align and secure joints to avoid offsets. Do not use patched forms for exposed concrete surfaces unless approved by Architect.

3.4 SHORES AND RESHORES

A. Comply with ACI 318 and ACI 301 for design, installation, and removal of shoring and reshoring.

1. Do not remove shoring or reshoring until measurement of slab tolerances is complete.

B. Plan sequence of removal of shores and reshore to avoid damage to concrete. Locate and provide adequate reshoring to support construction without excessive stress or deflection.

3.5 STEEL REINFORCEMENT

A. General: Comply with CRSI's "Manual of Standard Practice" for placing reinforcement.

B. Clean reinforcement of loose rust and mill scale, earth, ice, and other foreign materials that would reduce bond to concrete.

C. Accurately position, support, and secure reinforcement against displacement. Locate and support reinforcement with bar supports to maintain minimum concrete cover. Do not tack weld crossing reinforcing bars.

D. Set wire ties with ends directed into concrete, not toward exposed concrete surfaces.

3.6 JOINTS

A. General: Construct joints true to line with faces perpendicular to surface plane of concrete.

B. Construction Joints: Install so strength and appearance of concrete are not impaired.

1. Place joints perpendicular to main reinforcement. Continue reinforcement across construction joints, unless otherwise indicated. Do not continue reinforcement through sides of strip placements of floors and slabs.
2. Use a bonding agent at locations where fresh concrete is placed against hardened or partially hardened concrete surfaces.

C. Contraction Joints in Slabs-on-Grade: Form weakened-plane contraction joints, sectioning concrete into areas.

1. Grooved Joints: Form contraction joints after initial floating by grooving and finishing each edge of joint to a radius of 1/8 inch. Repeat grooving of contraction joints after applying surface finishes. Eliminate groover tool marks on concrete surfaces.

3.7 CONCRETE PLACEMENT

A. Before placing concrete, verify that installation of formwork, reinforcement, and embedded items is complete and that required inspections have been performed.

B. Do not add water to concrete during delivery, at Project site, or during placement.

C. Deposit concrete continuously in one layer or in horizontal layers of such thickness that no new concrete will be placed on concrete that has hardened enough to cause seams or planes of weakness. If a section cannot be placed continuously, provide construction joints as indicated. Deposit concrete to avoid segregation.

1. Deposit concrete in horizontal layers of depth to not exceed formwork design pressures and in a manner to avoid inclined construction joints.
2. Consolidate placed concrete with mechanical vibrating equipment according to ACI 301.
3. Do not use vibrators to transport concrete inside forms. Insert and withdraw vibrators vertically at uniformly spaced locations to rapidly penetrate placed layer and at least 6 inches into preceding layer. Do not insert vibrators into lower layers of concrete that have begun to lose plasticity. At each insertion, limit duration of vibration to time necessary to consolidate concrete and complete embedment of reinforcement and other embedded items without causing mixture constituents to segregate.

D. Deposit and consolidate concrete for slabs in a continuous operation, within limits of construction joints, until placement of a panel or section is complete.

1. Consolidate concrete during placement operations so concrete is thoroughly worked around reinforcement and other embedded items and into corners.
2. Maintain reinforcement in position on chairs during concrete placement.
3. Screed slab surfaces with a straightedge and strike off to correct elevations.
4. Slope surfaces uniformly to drains where required.
5. Begin initial floating using bull floats or darbies to form a uniform and open-textured surface plane, before excess bleedwater appears on the surface. Do not further disturb slab surfaces before starting finishing operations.

E. Cold-Weather Placement: Comply with ACI 306.1 and as follows. Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing actions, or low temperatures.

1. When average high and low temperature is expected to fall below 40 deg F for three successive days, maintain delivered concrete mixture temperature within the temperature range required by ACI 301.
2. Do not use frozen materials or materials containing ice or snow. Do not place concrete on frozen subgrade or on subgrade containing frozen materials.
3. Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators unless otherwise specified and approved in mixture designs.

F. Hot-Weather Placement: Comply with ACI 301 and as follows:

1. Maintain concrete temperature below 90 deg F at time of placement. Chilled mixing water or chopped ice may be used to control temperature, provided water equivalent of ice is calculated to total amount of mixing water. Using liquid nitrogen to cool concrete is Contractor's option.
2. Fog-spray forms, steel reinforcement, and subgrade just before placing concrete. Keep subgrade uniformly moist without standing water, soft spots, or dry areas.

3.8 FINISHING FORMED SURFACES

A. Smooth-Formed Finish: As-cast concrete texture imparted by form-facing material, arranged in an orderly and symmetrical manner with a minimum of seams. Repair and patch tie holes and defects. Remove fins and other projections that exceed specified limits on formed-surface irregularities.

1. Apply to concrete surfaces exposed to public view.

3.9 FINISHING FLOORS AND SLABS

A. General: Comply with ACI 302.1R recommendations for screeding, restraightening, and finishing operations for concrete surfaces. Do not wet concrete surfaces.

B. Broom Finish: Apply a broom finish to exterior concrete.

1. Immediately after float finishing, slightly roughen trafficked surface by brooming with fiber-bristle broom perpendicular to main traffic route.

3.10 MISCELLANEOUS CONCRETE ITEMS

A. Filling In: Fill in holes and openings left in concrete structures, unless otherwise indicated, after work of other trades is in place. Mix, place, and cure concrete, as specified, to blend with in-place construction. Provide other miscellaneous concrete filling indicated or required to complete the Work.

B. Equipment Bases and Foundations: Provide machine and equipment bases and foundations as shown on Drawings. Set anchor bolts for machines and equipment at correct elevations, complying with diagrams or templates from manufacturer furnishing machines and equipment.

3.11 CONCRETE PROTECTING AND CURING

A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. Comply with ACI 306.1 for cold-weather protection and ACI 301 for hot-weather protection during curing.

B. Evaporation Retarder: Apply evaporation retarder to unformed concrete surfaces if hot, dry, or windy conditions cause moisture loss approaching 0.2 lb/sq. ft. x h before and during finishing operations. Apply according to manufacturer's written instructions after placing, screeding, and bull floating or darbying concrete, but before float finishing.

C. Formed Surfaces: Cure formed concrete surfaces, including underside of beams, supported slabs, and other similar surfaces. If forms remain during curing period, moist cure after loosening forms. If removing forms before end of curing period, continue curing for the remainder of the curing period.

D. Unformed Surfaces: Begin curing immediately after finishing concrete. Cure unformed surfaces, including floors and slabs, concrete floor toppings, and other surfaces.

E. Cure concrete according to ACI 308.1, by one or a combination of the following methods:

1. Moisture Curing: Keep surfaces continuously moist for not less than seven days with the following materials:

   a. Water.
   b. Continuous water-fog spray.
   c. Absorptive cover, water saturated, and kept continuously wet. Cover concrete surfaces and edges with 12-inch lap over adjacent absorptive covers.

2. Moisture-Retaining-Cover Curing: Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width, with sides and ends lapped at least 12 inches, and sealed by waterproof tape or adhesive. Cure for not less than seven days. Immediately repair any holes or tears during curing period using cover material and waterproof tape.

3. Curing Compound: Apply uniformly in continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Maintain continuity of coating and repair damage during curing period.

   a. After curing period has elapsed, remove curing compound without damaging concrete surfaces by method recommended by curing compound manufacturer.

4. Curing and Sealing Compound: Apply uniformly to floors and slabs indicated in a continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Repeat process 24 hours later and apply a second coat. Maintain continuity of coating and repair damage during curing period.

3.12 LIQUID FLOOR TREATMENTS

A. Penetrating Liquid Floor Treatment: Prepare, apply, and finish penetrating liquid floor treatment according to manufacturer's written instructions.

1. Remove curing compounds, sealers, oil, dirt, laitance, and other contaminants and complete surface repairs.
2. Do not apply to concrete that is less than three days' old.
3. Apply liquid until surface is saturated, scrubbing into surface until a gel forms; rewet; and repeat brooming or scrubbing. Rinse with water; remove excess material until surface is dry. Apply a second coat in a similar manner if surface is rough or porous.

B. Sealing Coat: Uniformly apply a continuous sealing coat of curing and sealing compound to hardened concrete by power spray or roller according to manufacturer's written instructions.

3.13 JOINT FILLING

A. Prepare, clean, and install joint filler according to manufacturer's written instructions.

1. Defer joint filling until concrete has aged at least **one** month. Do not fill joints until construction traffic has permanently ceased.

B. Remove dirt, debris, saw cuttings, curing compounds, and sealers from joints; leave contact faces of joint clean and dry.

C. Install semirigid joint filler full depth in saw-cut joints and at least 2 inches deep in formed joints. Overfill joint and trim joint filler flush with top of joint after hardening.

3.14 CONCRETE SURFACE REPAIRS

A. Defective Concrete: Repair and patch defective areas. Remove and replace concrete that cannot be repaired and patched.

B. Patching Mortar: Mix dry-pack patching mortar, consisting of one part portland cement to two and one-half parts fine aggregate passing a No. 16 sieve, using only enough water for handling and placing.

C. Repairing Formed Surfaces: Surface defects, cracks, spalls, air bubbles, honeycombs, rock pockets, fins and other projections on the surface.

1. Immediately after form removal, cut out honeycombs, rock pockets, and voids more than 1/2 inch in any dimension in solid concrete, but not less than 3/4 inch in depth. Make edges of cuts perpendicular to concrete surface. Clean, dampen with water, and brush-coat holes and voids with bonding agent. Fill and compact with patching mortar before bonding agent has dried. Fill form-tie voids with patching mortar or cone plugs secured in place with bonding agent.
2. Repair defects on surfaces exposed to view by blending white portland cement and standard portland cement so that, when dry, patching mortar will match surrounding color. Patch a test area at inconspicuous locations to verify mixture and color match before proceeding with patching. Compact mortar in place and strike off slightly higher than surrounding surface.
3. Repair defects on concealed formed surfaces that affect concrete's durability and structural performance.

D. Repairing Unformed Surfaces: Test unformed surfaces, such as slabs, for finish and verify surface tolerances specified for each surface. Correct low and high areas. Test surfaces sloped to drain for trueness of slope and smoothness; use a sloped template.

1. Repair finished surfaces containing defects. Surface defects include spalls, popouts, honeycombs, rock pockets, crazing and cracks in excess of 0.01 inch wide or that penetrate to reinforcement or completely through unreinforced sections regardless of width, and other objectionable conditions.
2. After concrete has cured at least 14 days, correct high areas by grinding.
3. Correct localized low areas during or immediately after completing surface finishing operations by cutting out low areas and replacing with patching mortar. Finish repaired areas to blend into adjacent concrete.
4. Repair defective areas, except random cracks and single holes 1 inch or less in diameter, by cutting out and replacing with fresh concrete. Remove defective areas with clean, square cuts and expose steel reinforcement with at least a 3/4-inch clearance all around.

Dampen concrete surfaces in contact with patching concrete and apply bonding agent. Mix patching concrete of same materials and mixture as original concrete except without coarse aggregate. Place, compact, and finish to blend with adjacent finished concrete. Cure in same manner as adjacent concrete.

5. Repair random cracks and single holes 1 inch or less in diameter with patching mortar. Groove top of cracks and cut out holes to sound concrete and clean off dust, dirt, and loose particles. Dampen cleaned concrete surfaces and apply bonding agent. Place patching mortar before bonding agent has dried. Compact patching mortar and finish to match adjacent concrete. Keep patched area continuously moist for at least 72 hours.

E. Perform structural repairs of concrete, subject to Architect's approval, using epoxy adhesive and patching mortar.

F. Repair materials and installation not specified above may be used, subject to Architect's approval.

3.15 FIELD QUALITY CONTROL

A. Inspections:

1. Steel reinforcement placement.
2. Headed bolts and studs.
3. Verification of use of required design mixture.
4. Concrete placement, including conveying and depositing.
5. Curing procedures and maintenance of curing temperature.
6. Verification of concrete strength before removal of shores and forms from beams and slabs.

B. Measure slab flatness and levelness according to ASTM E 1155 within 24 hours of finishing.

END OF SECTION 033000

SECTION 260519 - LOW-VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General, Special and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the following:

1. Building wires and cables rated 600 V and less.
2. Connectors, splices, and terminations rated 600 V and less.

1.3 DEFINITIONS

A. EPDM: Ethylene-propylene-diene terpolymer rubber.

B. NBR: Acrylonitrile-butadiene rubber.

1.4 QUALITY ASSURANCE

A. Testing Agency Qualifications: An independent agency, with the experience and capability to conduct the testing indicated, that is a member company of the InterNational Electrical Testing Association or is a nationally recognized testing laboratory (NRTL) as defined by OSHA in 29 CFR 1910.7, and that is acceptable to authorities having jurisdiction.

1. Testing Agency's Field Supervisor: Person currently certified by the InterNational Electrical Testing Association or the National Institute for Certification in Engineering Technologies to supervise on-site testing specified in Part 3.

B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

C. Comply with NFPA 70.

PART 2 - PRODUCTS

2.1 CONDUCTORS AND CABLES

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Alcan Products Corporation; Alcan Cable Division.
2. American Insulated Wire Corp.; a Leviton Company.
3. General Cable Corporation.
4. Senator Wire & Cable Company.
5. Southwire Company.

B. Copper Conductors: Comply with NEMA WC 70.

C. Conductor Insulation: Comply with NEMA WC 70 for Types THW and THHN-THWN.

D. Multiconductor Cable: Comply with NEMA WC 70 for metal-clad cable, Type MC with ground wire.

2.2 CONNECTORS AND SPLICES

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. AFC Cable Systems, Inc.
2. Hubbell Power Systems, Inc.
3. O-Z/Gedney; EGS Electrical Group LLC.
4. 3M; Electrical Products Division.
5. Tyco Electronics Corp.

C. Description: Factory-fabricated connectors and splices of size, ampacity rating, material, type, and class for application and service indicated.

PART 3 - EXECUTION

3.1 CONDUCTOR MATERIAL APPLICATIONS

A. Feeders: Copper. Solid for No. 10 AWG and smaller; stranded for No. 8 AWG and larger.

B. Branch Circuits: Copper. Solid for No. 10 AWG and smaller; stranded for No. 8 AWG and larger.

3.2 CONDUCTOR INSULATION AND MULTICONDUCTOR CABLE APPLICATIONS AND WIRING METHODS

A. Service Entrance: Type THW, THHN-THWN, or XHHW single conductors in raceway.

B. Exposed Feeders: Type THW or THHN-THWN single conductors in raceway.

C. Feeders Concealed in Concrete, below Slabs-on-Grade, and Underground: Type THW or THHN-THWN single conductors in raceway.

D. Exposed Branch Circuits: Type THW or THHN-THWN single conductors in raceway.

E. Branch Circuits Concealed in Concrete, below Slabs-on-Grade, and Underground: Type THW or THHN-THWN single conductors in raceway.

F. Class 1 Control Circuits: Type THHN-THWN, in raceway.

G. Class 2 Control Circuits: Type THHN-THWN, in raceway or Power-limited cable, concealed in building finishes.

3.3 INSTALLATION OF CONDUCTORS AND CABLES

A. Use manufacturer-approved pulling compound or lubricant where necessary; compound used must not deteriorate conductor or insulation. Do not exceed manufacturer's recommended maximum pulling tensions and sidewall pressure values.

B. Use pulling means; including fish tape, cable, rope, and basket-weave wire/cable grips that will not damage cables or raceway.

C. Install exposed cables parallel and perpendicular to surfaces of exposed structural members, and follow surface contours where possible.

D. Support cables according to Section 260529 "Hangers and Supports for Electrical Systems."

E. Identify and color-code conductors and cables according to Section 260553 "Identification for Electrical Systems."

3.4 CONNECTIONS

A. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A and UL 486B.

B. Make splices and taps that are compatible with conductor material and that possess equivalent or better mechanical strength and insulation ratings than unspliced conductors.

C. Wiring at Outlets: Install conductor at each outlet, with at least 6 inches of slack.

3.5 FIELD QUALITY CONTROL

A. Testing Agency: Engage a qualified testing agency to perform tests and inspections and prepare test reports.

B. Perform tests and inspections and prepare test reports.

C. Tests and Inspections:

1. After installing conductors and cables and before electrical circuitry has been energized, test service entrance and feeder conductors for compliance with requirements.
2. Perform each visual and mechanical inspection and electrical test stated in NETA Acceptance Testing Specification. Certify compliance with test parameters.

D. Test Reports: Prepare a written report to record the following:

1. Test procedures used.
2. Test results that comply with requirements.
3. Test results that do not comply with requirements and corrective action taken to achieve compliance with requirements.

E. Remove and replace malfunctioning units and retest as specified above.

END OF SECTION 260519

SECTION 260526 - GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General, Special and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes: Grounding systems and equipment.

B. Section includes grounding systems and equipment, plus the following special applications:

1. Underground distribution grounding.

1.3 QUALITY ASSURANCE

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

B. Comply with UL 467 for grounding and bonding materials and equipment.

PART 2 - PRODUCTS

2.1 CONDUCTORS

A. Insulated Conductors: Copper wire or cable insulated for 600 V unless otherwise required by applicable Code or authorities having jurisdiction.

B. Bare Copper Conductors:

1. Solid Conductors: ASTM B 3.
2. Stranded Conductors: ASTM B 8.
3. Tinned Conductors: ASTM B 33.
4. Bonding Cable: 28 kcmil, 14 strands of No. 17 AWG conductor, 1/4 inch in diameter.
5. Bonding Conductor: No. 4 or No. 6 AWG, stranded conductor.
6. Bonding Jumper: Copper tape, braided conductors terminated with copper ferrules; 1-5/8 inches wide and 1/16 inch thick.

2.2 CONNECTORS

A. Listed and labeled by an NRTL acceptable to authorities having jurisdiction for applications in which used and for specific types, sizes, and combinations of conductors and other items connected.

B. Bolted Connectors for Conductors and Pipes: Copper or copper alloy, pressure type with at least two bolts.

1. Pipe Connectors: Clamp type, sized for pipe.

C. Welded Connectors: Exothermic-welding kits of types recommended by kit manufacturer for materials being joined and installation conditions.

D. Bus-bar Connectors: Mechanical type, cast silicon bronze, solderless compression-type wire terminals, and long-barrel, two-bolt connection to ground bus bar.

2.3 GROUNDING ELECTRODES

A. Ground Rods: Copper-clad; 3/4 inch by 10 feet in diameter.

B. Chemical-Enhanced Grounding Electrodes: Copper tube, straight or L-shaped, charged with nonhazardous electrolytic chemical salts.
1. Termination: Factory-attached No. 4/0 AWG bare conductor at least 48 inches long.
2. Backfill Material: Electrode manufacturer's recommended material.

PART 3 - EXECUTION

3.1 APPLICATIONS

A. Conductors: Install solid conductor for No. 8 AWG and smaller, and stranded conductors for No. 6 AWG and larger unless otherwise indicated.

B. Underground Grounding Conductors: Install bare or tinned-copper conductor, No. 2/0 AWG minimum.
1. Bury at least 30 inches below grade.

C. Conductor Terminations and Connections:

1. Pipe and Equipment Grounding Conductor Terminations: Bolted connectors.
2. Underground Connections: Exothermic welded connectors.
3. Connections to Structural Steel: Welded connectors.

3.2 GROUNDING UNDERGROUND DISTRIBUTION SYSTEM COMPONENTS

A. Comply with IEEE C2 grounding requirements.

B. Pad-Mounted Utility Transformers: For utility company transformers, install ground rods and ground ring around the pad in accordance with utility company standards and applicable code.

3.3 EQUIPMENT GROUNDING

A. Install insulated equipment grounding conductors with all feeders and branch circuits.

B. Install insulated equipment grounding conductors with the following items, in addition to those required by NFPA 70:

1. Feeders and branch circuits.
2. Lighting circuits.
3. Receptacle circuits.
4. Flexible raceway runs.

C. Metal Poles Supporting Outdoor Lighting Fixtures: Install grounding electrode and a separate insulated equipment grounding conductor in addition to grounding conductor installed with branch-circuit conductors.

3.4 INSTALLATION

A. Grounding Conductors: Route along shortest and straightest paths possible unless otherwise indicated or required by Code. Avoid obstructing access or placing conductors where they may be subjected to strain, impact, or damage.

B. Ground Rods: Drive rods until tops are 2 inches below final grade unless otherwise indicated.

1. Interconnect ground rods with grounding electrode conductor below grade and as otherwise indicated. Make connections without exposing steel or damaging coating if any.
2. For grounding electrode system, install at least three rods spaced at least one-rod length from each other and located at least the same distance from other grounding electrodes, and connect to the service grounding electrode conductor.

C. Bonding Straps and Jumpers: Install in locations accessible for inspection and maintenance except where routed through short lengths of conduit.

1. Bonding to Structure: Bond straps directly to basic structure, taking care not to penetrate any adjacent parts.
2. Bonding to Equipment Mounted on Vibration Isolation Hangers and Supports: Install bonding so vibration is not transmitted to rigidly mounted equipment.
3. Use exothermic-welded connectors for outdoor locations; if a disconnect-type connection is required, use a bolted clamp.

D. Ground Counterpoise: Install a grounding conductor, electrically connected to each ground rod and to main ground bus bar.
1. Install tinned-copper conductor not less than No. 2/0 AWG for ground counterpoise.
2. Bury ground ring not less than 30 inches from building's foundation.
3. Install three (3) ground rods equi-spaced at least 10 feet apart from each other.

3.5 FIELD QUALITY CONTROL

A. Perform tests and inspections.

B. Tests and Inspections:

1. After installing grounding system but before permanent electrical circuits have been energized, test for compliance with requirements.
2. Inspect physical and mechanical condition. Verify tightness of accessible, bolted, electrical connections with a calibrated torque wrench according to manufacturer's written instructions.
3. Test completed grounding system at each location where a maximum ground-resistance level is specified, at service disconnect enclosure grounding terminal**,** and at individual ground rods. Make tests at ground rods before any conductors are connected.

    a. Measure ground resistance no fewer than two full days after last trace of precipitation and without soil being moistened by any means other than natural drainage or seepage and without chemical treatment or other artificial means of reducing natural ground resistance.
    b. Perform tests by fall-of-potential method according to IEEE 81.

4. Prepare dimensioned Drawings locating each ground rod, and other grounding electrodes. Identify each by letter in alphabetical order, and key to the record of tests and observations. Include the number of rods driven and their depth at each location, and include observations of weather and other phenomena that may affect test results. Describe measures taken to improve test results.

C. Grounding system will be considered defective if it does not pass tests and inspections.

D. Prepare test and inspection reports.

E. Report measured ground resistances that exceed the following values:

1. Power and Lighting Equipment or System with Capacity of 500 kVA and Less: 10 ohms.
2. Power and Lighting Equipment or System with Capacity of 500 to 1000 kVA: 5 ohms.
3. Power and Lighting Equipment or System with Capacity More Than 1000 kVA: 3 ohms.
4. Power Distribution Units or Panelboards Serving Electronic Equipment: 3 ohms.
5. Pad-Mounted Equipment: 5 ohms.

F. Excessive Ground Resistance: If resistance to ground exceeds specified values, notify Engineer promptly and include recommendations to reduce ground resistance.

END OF SECTION 260526

SECTION 260529 - HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General, Special and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the following:

1. Hangers and supports for electrical equipment and systems.
2. Construction requirements for concrete bases.

1.3 DEFINITIONS

A. EMT: Electrical metallic tubing.

B. IMC: Intermediate metal conduit.

C. RMC: Rigid metal conduit.

1.4 PERFORMANCE REQUIREMENTS

A. Delegated Design: Design supports for multiple raceways, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.

B. Design supports for multiple raceways capable of supporting combined weight of supported systems and its contents.

C. Design equipment supports capable of supporting combined operating weight of supported equipment and connected systems and components.

D. Rated Strength: Adequate in tension, shear, and pullout force to resist maximum loads calculated or imposed for this Project, with a minimum structural safety factor of five times the applied force.

1.5 QUALITY ASSURANCE

A. Welding: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."

B. Comply with NFPA 70.

1.6 COORDINATION

A. Coordinate size and location of concrete bases. Cast anchor-bolt inserts into bases. Concrete, reinforcement, and formwork requirements are specified together with concrete Specifications.

B. Coordinate installation of roof curbs, equipment supports, and roof penetrations.

PART 2 - PRODUCTS

2.1 SUPPORT, ANCHORAGE, AND ATTACHMENT COMPONENTS

A. Steel Slotted Support Systems: Comply with MFMA-4, factory-fabricated components for field assembly.

1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

a. Allied Tube & Conduit.
b. Cooper B-Line, Inc.; a division of Cooper Industries.
c. ERICO International Corporation.
d. GS Metals Corp.
e. Thomas & Betts Corporation.
f. Unistrut; Tyco International, Ltd.
g. Wesanco, Inc.

2. Metallic Coatings: Hot-dip galvanized after fabrication and applied according to MFMA-4.
3. Nonmetallic Coatings: Manufacturer's standard PVC, polyurethane, or polyester coating applied according to MFMA-4.
4. Painted Coatings: Manufacturer's standard painted coating applied according to MFMA-4.
5. Channel Dimensions: Selected for applicable load criteria.

B. Raceway and Cable Supports: As described in NECA 1 and NECA 101.

C. Conduit and Cable Support Devices: Steel and malleable-iron hangers, clamps, and associated fittings, designed for types and sizes of raceway or cable to be supported.

D. Support for Conductors in Vertical Conduit: Factory-fabricated assembly consisting of threaded body and insulating wedging plug or plugs for non-armored electrical conductors or cables in riser conduits. Plugs shall have number, size, and shape of conductor gripping pieces as required to suit individual conductors or cables supported. Body shall be malleable iron.

E. Structural Steel for Fabricated Supports and Restraints: ASTM A 36/A 36M, steel plates, shapes, and bars; black and galvanized.

F. Mounting, Anchoring, and Attachment Components: Items for fastening electrical items or their supports to building surfaces include the following:

1. Powder-Actuated Fasteners: Threaded-steel stud, for use in hardened portland cement concrete, steel, or wood, with tension, shear, and pullout capacities appropriate for supported loads and building materials where used.

a. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. Hilti Inc.
2. ITW Ramset/Red Head; a division of Illinois Tool Works, Inc.
3. MKT Fastening, LLC.
4. Simpson Strong-Tie Co., Inc.; Masterset Fastening Systems Unit.

2. Mechanical-Expansion Anchors: Insert-wedge-type, zinc-coated or stainless steel, for use in hardened portland cement concrete with tension, shear, and pullout capacities appropriate for supported loads and building materials in which used.

a. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. Cooper B-Line, Inc.; a division of Cooper Industries.
2. Empire Tool and Manufacturing Co., Inc.
3. Hilti Inc.
4. ITW Ramset/Red Head; a division of Illinois Tool Works, Inc.
5. MKT Fastening, LLC.

3. Concrete Inserts: Steel or malleable-iron, slotted support system units similar to MSS Type 18; complying with MFMA-4 or MSS SP-58.
4. Clamps for Attachment to Steel Structural Elements: MSS SP-58, type suitable for attached structural element.
5. Through Bolts: Structural type, hex head, and high strength. Comply with ASTM A 325.
6. Toggle Bolts: All-steel springhead type.
7. Hanger Rods: Threaded steel.

2.2 FABRICATED METAL EQUIPMENT SUPPORT ASSEMBLIES

A. Description: Welded or bolted, structural-steel shapes, shop or field fabricated to fit dimensions of supported equipment.

PART 3 - EXECUTION

3.1 APPLICATION

A. Comply with NECA 1 and NECA 101 for application of hangers and supports for electrical equipment and systems except if requirements in this Section are stricter.

B. Maximum Support Spacing and Minimum Hanger Rod Size for Raceway: Space supports for EMT, IMC, and RMC as scheduled in NECA 1, where its Table 1 lists maximum spacings less than stated in NFPA 70. Minimum rod size shall be 1/4 inch in diameter.

C. Multiple Raceways or Cables: Install trapeze-type supports fabricated with steel slotted or other support system, sized so capacity can be increased by at least 25 percent in future without exceeding specified design load limits.

1. Secure raceways and cables to these supports with two-bolt conduit clamps or single-bolt conduit clamps.

D. Spring-steel clamps designed for supporting single conduits without bolts may be used for 1-1/2-inch and smaller raceways serving branch circuits and communication systems above suspended ceilings and for fastening raceways to trapeze supports.

3.2 SUPPORT INSTALLATION

A. Comply with NECA 1 and NECA 101 for installation requirements except as specified in this Article.

B. Raceway Support Methods: In addition to methods described in NECA 1, EMT, IMC, and RMC may be supported by openings through structure members, as permitted in NFPA 70.

C. Strength of Support Assemblies: Where not indicated, select sizes of components so strength will be adequate to carry present and future static loads within specified loading limits. Minimum static design load used for strength determination shall be weight of supported components plus 200 lb.

D. Mounting and Anchorage of Surface-Mounted Equipment and Components: Anchor and fasten electrical items and their supports to building structural elements by the following methods unless otherwise indicated by code:

1. To Wood: Fasten with lag screws or through bolts.
2. To New Concrete: Bolt to concrete inserts.
3. To Masonry: Approved toggle-type bolts on hollow masonry units and expansion anchor fasteners on solid masonry units.
4. To Existing Concrete: Expansion anchor fasteners.
5. Instead of expansion anchors, powder-actuated driven threaded studs provided with lock washers and nuts may be used in existing standard-weight concrete 4 inches thick or greater. Do not use for anchorage to lightweight-aggregate concrete or for slabs less than 4 inches thick.

6. To Steel: Welded threaded studs complying with AWS D1.1/D1.1M, with lock washers and nuts, or Beam clamps (MSS Type 19, 21, 23, 25, or 27) complying with MSS SP-69.
7. To Light Steel: Sheet metal screws.
8. Items Mounted on Hollow Walls and Nonstructural Building Surfaces: Mount cabinets, panelboards, disconnect switches, control enclosures, pull and junction boxes, transformers, and other devices on slotted-channel racks attached to substrate by means that meet seismic-restraint strength and anchorage requirements.

E. Drill holes for expansion anchors in concrete at locations and to depths that avoid reinforcing bars.

3.3 INSTALLATION OF FABRICATED METAL SUPPORTS

A. Cut, fit, and place miscellaneous metal supports accurately in location, alignment, and elevation to support and anchor electrical materials and equipment.

B. Field Welding: Comply with AWS D1.1/D1.1M.

3.4 CONCRETE BASES

A. Construct concrete bases of dimensions indicated but not less than 4 inches larger in both directions than supported unit, and so anchors will be a minimum of 10 bolt diameters from edge of the base.

B. Use 3000-psi, 28-day compressive-strength concrete. Concrete materials, reinforcement, and placement requirements are specified in Section 033000 "Cast-in-Place Concrete."

C. Anchor equipment to concrete base.
1. Place and secure anchorage devices. Use supported equipment manufacturer's setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
2. Install anchor bolts to elevations required for proper attachment to supported equipment.
3. Install anchor bolts according to anchor-bolt manufacturer's written instructions.

3.5 PAINTING

A. Touchup: Clean field welds and abraded areas of shop paint. Paint exposed areas immediately after erecting hangers and supports. Use same materials as used for shop painting. Comply with SSPC-PA 1 requirements for touching up field-painted surfaces.

1. Apply paint by brush or spray to provide minimum dry film thickness of 2.0 mils.

B. Galvanized Surfaces: Clean welds, bolted connections, and abraded areas and apply galvanizing-repair paint to comply with ASTM A 780.

END OF SECTION 260529

SECTION 260533 - RACEWAYS AND BOXES FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General, Special and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Metal conduits, tubing, and fittings.
2. Nonmetal conduits, tubing, and fittings.
3. Metal wireways and auxiliary gutters.
4. Boxes, enclosures, and cabinets.
5. Handholes and boxes for exterior underground cabling.

B. Related Requirements:

1. Section 260543 "Underground Ducts and Raceways for Electrical Systems" for exterior ductbanks and underground utility construction.

1.3 DEFINITIONS

A. ARC: Aluminum rigid conduit.

B. GRC: Galvanized rigid steel conduit.

C. IMC: Intermediate metal conduit.

1.4 INFORMATIONAL SUBMITTALS

A. Coordination Drawings: Conduit routing plans, drawn to scale.

PART 2 - PRODUCTS

2.1 METAL CONDUITS, TUBING, AND FITTINGS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. AFC Cable Systems, Inc.

2. Allied Tube & Conduit; a Tyco International Ltd. Co.
3. Anamet Electrical, Inc.
4. Electri-Flex Company.
5. O-Z/Gedney; a brand of EGS Electrical Group.
6. Picoma Industries, a subsidiary of Mueller Water Products, Inc.
7. Republic Conduit.
8. Robroy Industries.
9. Southwire Company.
10. Thomas & Betts Corporation.
11. Western Tube and Conduit Corporation.
12. Wheatland Tube Company; a division of John Maneely Company.

B. Listing and Labeling: Metal conduits, tubing, and fittings shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

C. GRC: Comply with ANSI C80.1 and UL 6.

D. ARC: Comply with ANSI C80.5 and UL 6A.

E. IMC: Comply with ANSI C80.6 and UL 1242.

F. PVC-Coated Steel Conduit: PVC-coated IMC.

1. Comply with NEMA RN 1.
2. Coating Thickness: 0.040 inch, minimum.

G. EMT: Comply with ANSI C80.3 and UL 797.

H. LFMC: Flexible steel conduit with PVC jacket and complying with UL 360.

I. Fittings for Metal Conduit: Comply with NEMA FB 1 and UL 514B.

1. Conduit Fittings for Hazardous (Classified) Locations: Comply with UL 886 and NFPA 70.
2. Fittings for EMT:

    a. Material: Steel or die cast.
    b. Type: Setscrew or compression.

3. Expansion Fittings: PVC or steel to match conduit type, complying with UL 651, rated for environmental conditions where installed, and including flexible external bonding jumper.
4. Coating for Fittings for PVC-Coated Conduit: Minimum thickness of 0.040 inch, with overlapping sleeves protecting threaded joints.

J. Joint Compound for IMC, GRC, or ARC: Approved, as defined in NFPA 70, by authorities having jurisdiction for use in conduit assemblies, and compounded for use to lubricate and protect threaded conduit joints from corrosion and to enhance their conductivity.

2.2 NONMETALLIC CONDUITS, TUBING, AND FITTINGS

A. Manufacturers: Subject to compliance with requirements, provide products by the following:

1. AFC Cable Systems, Inc.
2. Anamet Electrical, Inc.
3. Arnco Corporation.
4. CANTEX Inc.
5. CertainTeed Corp.
6. Condux International, Inc.
7. Electri-Flex Company.
8. Kraloy.
9. Lamson & Sessions; Carlon Electrical Products.
10. Niedax-Kleinhuis USA, Inc.
11. RACO; a Hubbell company.
12. Thomas & Betts Corporation.

B. Listing and Labeling: Nonmetallic conduits, tubing, and fittings shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

C. ENT: Comply with NEMA TC 13 and UL 1653.

D. RNC: Type EPC-40-PVC, complying with NEMA TC 2 and UL 651 unless otherwise indicated.

E. LFNC: Comply with UL 1660.

F. Rigid HDPE: Comply with UL 651A.

G. Continuous HDPE: Comply with UL 651B.

H. Coilable HDPE: Preassembled with conductors or cables, and complying with ASTM D 3485.

I. RTRC: Comply with UL 1684A and NEMA TC 14.

J. Fittings for ENT and RNC: Comply with NEMA TC 3; match to conduit or tubing type and material.

K. Fittings for LFNC: Comply with UL 514B.

L. Solvent cements and adhesive primers shall have a VOC content of 510 and 550 g/L or less, respectively, when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

M. Solvent cements and adhesive primers shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

2.3 METAL WIREWAYS AND AUXILIARY GUTTERS

A. Manufacturers: Subject to compliance with requirements, provide products by the following:

1. Cooper B-Line, Inc.
2. Hoffman; a Pentair company.
3. Mono-Systems, Inc.
4. Square D; a brand of Schneider Electric.

B. Description: Sheet metal, complying with UL 870 and NEMA 250, Type 1 unless otherwise indicated, and sized according to NFPA 70.

1. Metal wireways installed outdoors shall be NEMA 3R listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

C. Fittings and Accessories: Include covers, couplings, offsets, elbows, expansion joints, adapters, hold-down straps, end caps, and other fittings to match and mate with wireways as required for complete system.

D. Wireway Covers: NEMA 1 - Screw-cover type; NEMA 3R - Flanged-and-gasketed type unless otherwise indicated.

E. Finish: Manufacturer's standard enamel finish.

2.4 BOXES, ENCLOSURES, AND CABINETS

A. Manufacturers: Subject to compliance with requirements, provide products by the following:

1. Adalet.
2. Cooper Technologies Company; Cooper Crouse-Hinds.
3. EGS/Appleton Electric.
4. Erickson Electrical Equipment Company.
5. FSR Inc.
6. Hoffman; a Pentair company.
7. Hubbell Incorporated; Killark Division.
8. Kraloy.
9. Milbank Manufacturing Co.
10. Mono-Systems, Inc.
11. O-Z/Gedney; a brand of EGS Electrical Group.
12. RACO; a Hubbell Company.
13. Robroy Industries.
14. Spring City Electrical Manufacturing Company.
15. Thomas & Betts Corporation.
16. Wiremold / Legrand.

B. General Requirements for Boxes, Enclosures, and Cabinets: Boxes, enclosures, and cabinets installed in wet locations shall be listed for use in wet locations.

C. Cast-Metal Outlet and Device Boxes: Comply with NEMA FB 1, ferrous alloy, Type FD, with gasketed cover.

D. Small Sheet Metal Pull and Junction Boxes: NEMA OS 1.

E. Cast-Metal Access, Pull, and Junction Boxes: Comply with NEMA FB 1 and UL 1773, cast aluminum or galvanized, cast iron with gasketed cover.

F. Device Box Dimensions: 2-gang - 4 inches square by 2-1/8 inches deep; single gang - 4 inches by 2-1/8 inches by 2-1/8 inches deep.

G. Gangable boxes are allowed beyond 2-gang boxes.

H. Hinged-Cover Enclosures: Comply with UL 50 and NEMA 250, Type 1 with continuous-hinge cover with flush latch unless otherwise indicated.

1. Metal Enclosures: Steel, finished inside and out with manufacturer's standard enamel.
2. Interior Panels: Steel; all sides finished with manufacturer's standard enamel.

I. Cabinets:

1. NEMA 250, Type 1 galvanized-steel box with removable interior panel and removable front, finished inside and out with manufacturer's standard enamel.
2. Hinged door in front cover with flush latch and concealed hinge.
3. Metal barriers to separate wiring of different systems and voltage.
4. Accessory feet where required for freestanding equipment.

PART 3 - EXECUTION

3.1 RACEWAY APPLICATION

A. Outdoors: Apply raceway products as specified below unless otherwise indicated:

1. Exposed Conduit: GRC, PVC-coated IMC, or ARC.
2. Concealed Conduit, Aboveground: IMC.
3. Underground Conduit: RNC, Type EPC-40-PVC, direct buried or concrete encased.
4. Connection to Vibrating Equipment (Including Transformers and Hydraulic, Pneumatic, Electric Solenoid, or Motor-Driven Equipment): LFMC.
5. Boxes and Enclosures, Aboveground: NEMA 250, Type 3R.

B. Minimum Raceway Size: 3/4-inch trade size.

C. Raceway Fittings: Compatible with raceways and suitable for use and location.

1. Rigid and Intermediate Steel Conduit: Use threaded rigid steel conduit fittings unless otherwise indicated. Comply with NEMA FB 2.10.
2. PVC Externally Coated, Rigid Steel Conduits: Use only fittings listed for use with this type of conduit. Patch and seal all joints, nicks, and scrapes in PVC coating after installing conduits and fittings. Use sealant recommended by fitting manufacturer and apply in thickness and number of coats recommended by manufacturer.
3. EMT: Use setscrew or compression, steel or cast-metal fittings. Comply with NEMA FB 2.10.
4. Flexible Conduit: Use only fittings listed for use with flexible conduit. Comply with NEMA FB 2.20.

D. Install nonferrous conduit or tubing for circuits operating above 60 Hz. Where aluminum raceways are installed for such circuits and pass through concrete, install in nonmetallic sleeve.

E. Do not install aluminum conduits, boxes, or fittings in contact with concrete or earth.

F. Do not install nonmetallic conduit where ambient temperature exceeds 120 deg F.

3.2 INSTALLATION

A. Comply with NECA 1 and NECA 101 for installation requirements except where requirements on Drawings or in this article are stricter. Comply with NECA 102 for aluminum conduits. Comply with NFPA 70 limitations for types of raceways allowed in specific occupancies and number of floors.

B. Complete raceway installation before starting conductor installation.

C. Comply with requirements in Section 260529 "Hangers and Supports for Electrical Systems" for hangers and supports.

D. Arrange stub-ups so curved portions of bends are not visible above finished slab.

E. Install no more than the equivalent of three 90-degree bends in any conduit run except for control wiring conduits, for which fewer bends are allowed. Support within 12 inches of changes in direction.

F. Support conduit within 12 inches of enclosures to which attached.

G. Threaded Conduit Joints, Exposed to Wet, Damp, Corrosive, or Outdoor Conditions: Apply listed compound to threads of raceway and fittings before making up joints. Follow compound manufacturer's written instructions.

H. Coat field-cut threads on PVC-coated raceway with a corrosion-preventing conductive compound prior to assembly.

I. Raceway Terminations at Locations Subject to Moisture or Vibration: Use insulating bushings to protect conductors including conductors smaller than No. 4 AWG.

J. Terminate threaded conduits into threaded hubs or with locknuts on inside and outside of boxes or cabinets. Install bushings on conduits up to 1-1/4-inch trade size and insulated throat metal bushings on 1-1/2-inch trade size and larger conduits terminated with locknuts. Install insulated throat metal grounding bushings on service conduits.

K. Install raceways square to the enclosure and terminate at enclosures with locknuts. Install locknuts hand tight plus 1/4 turn more.

L. Do not rely on locknuts to penetrate nonconductive coatings on enclosures. Remove coatings in the locknut area prior to assembling conduit to enclosure to assure a continuous ground path.

M. Cut conduit perpendicular to the length. For conduits 2-inch trade size and larger, use roll cutter or a guide to make cut straight and perpendicular to the length.

N. Install pull wires in empty raceways. Use polypropylene or monofilament plastic line with not less than 200-lb tensile strength. Leave at least 12 inches of slack at each end of pull wire. Cap underground raceways designated as spare above grade alongside raceways in use.

O. Install raceway sealing fittings at accessible locations according to NFPA 70 and fill them with listed sealing compound. For concealed raceways, install each fitting in a flush steel box with a blank cover plate having a finish similar to that of adjacent plates or surfaces. Install raceway sealing fittings according to NFPA 70.

P. Comply with manufacturer's written instructions for solvent welding RNC and fittings.

Q. Expansion-Joint Fittings:

1. Install in each run of aboveground RNC that is located where environmental temperature change may exceed 30 deg F and that has straight-run length that exceeds 25 feet. Install in each run of aboveground RMC conduit that is located where environmental temperature change may exceed 100 deg F and that has straight-run length that exceeds 100 feet.
2. Install type and quantity of fittings that accommodate temperature change listed for each of the following locations:

    a. Outdoor Locations Not Exposed to Direct Sunlight: 125 deg F temperature change.
    b. Outdoor Locations Exposed to Direct Sunlight: 155 deg F temperature change.

3. Install fitting(s) that provide expansion and contraction for at least 0.00041 inch per foot of length of straight run per deg F of temperature change for PVC conduits. Install fitting(s) that provide expansion and contraction for at least 0.000078 inch per foot of length of straight run per deg F of temperature change for metal conduits.
4. Install expansion fittings at all locations where conduits cross building or structure expansion joints.
5. Install each expansion-joint fitting with position, mounting, and piston setting selected according to manufacturer's written instructions for conditions at specific location at time of installation. Install conduit supports to allow for expansion movement.

R. Flexible Conduit Connections: Comply with NEMA RV 3. Use a maximum of 24 inches of LFMC for equipment subject to vibration, noise transmission, or movement.

S. Mount boxes at heights indicated on Drawings. If mounting heights of boxes are not individually indicated, give priority to ADA requirements.

T. Fasten junction and pull boxes to or support from building structure. Do not support boxes by conduits.

3.3 INSTALLATION OF UNDERGROUND CONDUIT

A. Direct-Buried Conduit:

1. Excavate trench bottom to provide firm and uniform support for conduit. Prepare trench bottom as specified in Section 312000 "Earth Moving" for pipe less than 6 inches in nominal diameter.
2. Install backfill as specified in Section 312000 "Earth Moving."
3. After installing conduit, backfill and compact. Start at tie-in point, and work toward end of conduit run, leaving conduit at end of run free to move with expansion and contraction as temperature changes during this process. Firmly hand tamp backfill around conduit to provide maximum supporting strength. After placing controlled backfill to within 12 inches of finished grade, make final conduit connection at end of run and complete backfilling with normal compaction as specified in Section 312000 "Earth Moving."
4. Install manufactured rigid steel conduit elbows (large sweep) for stub-ups at poles and equipment.

    a. Couple steel conduits to ducts with adapters designed for this purpose, and encase coupling with 3 inches of concrete for a minimum of 12 inches on each side of the coupling.
    b. For stub-ups where conduits penetrate building foundations, extend steel conduit horizontally a minimum of 60 inches from edge of foundation or equipment base. Install insulated grounding bushings on terminations at equipment.
5. Underground Warning Tape: Comply with requirements in Section 260553 "Identification for Electrical Systems."

3.4 INSTALLATION OF UNDERGROUND HANDHOLES AND BOXES

A. Install handholes and boxes level and plumb and with orientation and depth coordinated with connecting conduits to minimize bends and deflections required for proper entrances.

B. Unless otherwise indicated, support units on a level bed of crushed stone or gravel, graded from 1/2-inch sieve to No. 4 sieve and compacted to same density as adjacent undisturbed earth.

C. Elevation: In paved areas, set so cover surface will be flush with finished grade. Set covers of other enclosures 1 inch above finished grade.

D. Install removable hardware, including pulling eyes, cable stanchions, cable arms, and insulators, as required for installation and support of cables and conductors and as indicated. Select arm lengths to be long enough to provide spare space for future cables but short enough to preserve adequate working clearances in enclosure.

E. Field-cut openings for conduits according to enclosure manufacturer's written instructions. Cut wall of enclosure with a tool designed for material to be cut. Size holes for terminating fittings to be used, and seal around penetrations after fittings are installed.

3.5 PROTECTION

A. Protect coatings, finishes, and cabinets from damage and deterioration.

1. Repair damage to galvanized finishes with zinc-rich paint recommended by manufacturer.

2. Repair damage to PVC coatings or paint finishes with matching touchup coating recommended by manufacturer.

END OF SECTION 260533

SECTION 260543 - UNDERGROUND DUCTS AND RACEWAYS FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General, Special and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the following:

1. Conduit, ducts, and duct accessories for direct-buried and concrete-encased duct banks, and in single duct runs.
2. Handholes and boxes.

1.3 DEFINITION

A. RNC: Rigid nonmetallic conduit.

1.4 INFORMATIONAL SUBMITTALS

A. Duct-Bank Coordination Drawings: Show duct profiles and coordination with other utilities and underground structures.

1. Include plans and sections, drawn to scale, and show bends and locations of expansion fittings.

1.5 QUALITY ASSURANCE

A. Testing Agency Qualifications: Qualified according to ASTM E 329 for testing indicated.

B. Comply with ANSI C2.

C. Comply with NFPA 70.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver ducts to Project site with ends capped. Store nonmetallic ducts with supports to prevent bending, warping, and deforming.

B. Store precast concrete and other factory-fabricated underground utility structures at Project site as recommended by manufacturer to prevent physical damage. Arrange so identification markings are visible.

C. Lift and support precast concrete units only at designated lifting or supporting points.

1.7 PROJECT CONDITIONS

A. Interruption of Existing Electrical Service: Do not interrupt electrical service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary electrical service according to requirements indicated:

1. Notify Engineer no fewer than two weeks in advance of proposed interruption of electrical service.
2. Do not proceed with interruption of electrical service without Engineer's written permission.

1.8 COORDINATION

A. Coordinate layout and installation of ducts, handholes, and boxes with final arrangement of other utilities, site grading, and surface features as determined in the field.

B. Coordinate elevations of ducts and duct-bank entrances into handholes, and boxes with final locations and profiles of ducts and duct banks as determined by coordination with other utilities, underground obstructions, and surface features. Revise locations and elevations from those indicated as required to suit field conditions and to ensure that duct runs drain to handholes.

PART 2 - PRODUCTS

2.1 CONDUIT

A. Rigid Steel Conduit: Galvanized. Comply with ANSI C80.1.

B. RNC: NEMA TC 2, Type EPC-40-PVC, UL 651, with matching fittings by same manufacturer as the conduit, complying with NEMA TC 3 and UL 514B.

2.2 DUCT ACCESSORIES

A. Duct Accessories:

1. Duct Separators: Factory-fabricated rigid PVC interlocking spacers, sized for type and sizes of ducts with which used, and selected to provide minimum duct spacings indicated while supporting ducts during concreting or backfilling.
2. Warning Tape: Underground-line warning tape specified in Section 260553 "Identification for Electrical Systems."

2.3 HANDHOLES AND BOXES OTHER THAN PRECAST CONCRETE

A. Description: Comply with SCTE 77.

1. Color: Gray.
2. Configuration: Units shall be designed for flush burial and have open bottom, unless otherwise indicated.
3. Cover: Weatherproof, secured by tamper-resistant locking devices and having structural load rating consistent with enclosure.
4. Cover Finish: Nonskid finish shall have a minimum coefficient of friction of 0.50.
5. Cover Legend: Molded lettering, "ELECTRIC" as indicated on the drawings.

B. Polymer Concrete Handholes and Boxes with Polymer Concrete Cover: Molded of sand and aggregate, bound together with a polymer resin, and reinforced with steel or fiberglass or a combination of the two.

1. Basis-of-Design Product: Subject to compliance with requirements, provide the product indicated on Drawings manufactured by the following:

a. Quazite.
b. New Basis.

2.4 SOURCE QUALITY CONTROL

A. Test and inspect precast concrete utility structures according to ASTM C 1037.

B. Nonconcrete Handhole and Pull-Box Prototype Test: Test prototypes of manholes and boxes for compliance with SCTE 77. Strength tests shall be for specified tier ratings of products supplied.

PART 3 - EXECUTION

3.1 UNDERGROUND DUCT APPLICATION

A. Ducts for Electrical Feeders 600 V and Less: RNC, NEMA Type EPC-40-PVC, in concrete-encased duct bank, unless otherwise indicated.

B. Ducts for Electrical Branch Circuits: RNC, NEMA Type EPC-40-PVC, in direct-buried duct bank, unless otherwise indicated.

C. Underground Ducts Crossing Paved Paths, Walks, and Driveways/Roadways: RNC, NEMA Type EPC-40-PVC, encased in reinforced concrete.

3.2 UNDERGROUND ENCLOSURE APPLICATION

A. Handholes and Boxes for 600 V and Less:

1. Units in Driveway, Parking Lot, and Off-Roadway Locations, Subject to Occasional, Nondeliberate Loading by Heavy Vehicles: Precast concrete, AASHTO HB 17, H-20 structural load rating.
2. Units in Sidewalk and Similar Applications with a Safety Factor for Nondeliberate Loading by Vehicles: Precast concrete, AASHTO HB 17, H-10; Polymer concrete units, SCTE 77, Tier 8 structural load rating.

3.3 EARTHWORK

A. Excavation and Backfill: Comply with Section 312000 "Earth Moving," but do not use heavy-duty, hydraulic-operated, compaction equipment.

B. Restore surface features at areas disturbed by excavation and reestablish original grades, unless otherwise indicated. Replace removed sod immediately after backfilling is completed.

C. Restore areas disturbed by trenching, storing of dirt, cable laying, and other work. Restore vegetation and include necessary topsoiling, fertilizing, liming, seeding, sodding, sprigging, and mulching. Comply with Section 329200 "Turf and Grasses".

3.4 DUCT INSTALLATION

A. Slope: Pitch ducts a minimum slope of 1:300 down toward handholes, and away from buildings and equipment.

B. Curves and Bends: Use 5-degree angle couplings for small changes in direction. Use manufactured long sweep (PVC coated, rigid galvanized steel) bends with a minimum radius of 48 inches both horizontally and vertically, at other locations, unless otherwise indicated.

C. Joints: Use solvent-cemented joints in ducts and fittings and make watertight according to manufacturer's written instructions. Stagger couplings so those of adjacent ducts do not lie in same plane.

D. Duct Entrances to Polymer Concrete Handholes: Use end bells, spaced approximately 10 inches o.c. for 5-inch ducts, and vary proportionately for other duct sizes.

1. Begin change from regular spacing to end-bell spacing 10 feet from the end bell without reducing duct line slope and without forming a trap in the line.
2. Direct-Buried Duct Banks: Install an expansion and deflection fitting in each conduit in the area of disturbed earth adjacent to vault.
3. Grout end bells into structure walls from both sides to provide watertight entrances.

E. Building Wall Penetrations: Make a transition from underground duct to rigid steel conduit at least 10 feet outside the building wall without reducing duct line slope away from the building, and without forming a trap in the line. Use fittings manufactured for duct-to-conduit transition. Install conduit penetrations of building walls as specified in Section 260544 "Sleeves and Sleeve Seals for Electrical Raceways and Cabling."

F. Sealing: Provide temporary closure at terminations of ducts that have cables pulled. Seal spare ducts at terminations. Use sealing compound and plugs to withstand at least 15-psig hydrostatic pressure.

G. Pulling Cord: Install 100-lbf- test nylon cord in ducts, including spares.

H. Direct-Buried Duct Banks:

1. Support ducts on duct separators coordinated with duct size, duct spacing, and outdoor temperature.
2. Space separators close enough to prevent sagging and deforming of ducts, with not less than 5 spacers per 20 feet of duct. Secure separators to earth and to ducts to prevent displacement during backfill and yet permit linear duct movement due to expansion and contraction as temperature changes. Stagger spacers approximately 6 inches between tiers.
3. Excavate trench bottom to provide firm and uniform support for duct bank. Prepare trench bottoms as specified in Section 312000 "Earth Moving" for pipes less than 6 inches in nominal diameter.
4. Install backfill as specified in Section 312000 "Earth Moving."
5. After installing first tier of ducts, backfill and compact. Start at tie-in point and work toward end of duct run, leaving ducts at end of run free to move with expansion and contraction as temperature changes during this process. Repeat procedure after placing each tier. After placing last tier, hand-place backfill to 4 inches over ducts and hand tamp. Firmly tamp backfill around ducts to provide maximum supporting strength. Use hand tamper only. After placing controlled backfill over final tier, make final duct connections at end of run and complete backfilling with normal compaction as specified in Section 312000 "Earth Moving."
6. Install ducts with a minimum of 3 inches between ducts for like services and 12 inches between power and signal ducts.
7. Depth: Install top of duct bank at least 36 inches below finished grade, unless otherwise indicated.
8. Install manufactured rigid steel conduit elbows for stub-ups at poles and equipment and at building entrances.

    a. Couple steel conduits to ducts with adapters designed for this purpose, and encase coupling with 3 inches of concrete.
    b. For equipment mounted on outdoor concrete bases, extend steel conduit horizontally a minimum of 60 inches from edge of equipment pad or foundation. Install insulated grounding bushings on terminations at equipment.

3.5 INSTALLATION OF HANDHOLES AND BOXES OTHER THAN PRECAST CONCRETE

A. Install handholes and boxes level and plumb and with orientation and depth coordinated with connecting ducts to minimize bends and deflections required for proper entrances. Use box extension if required to match depths of ducts, and seal joint between box and extension as recommended by the manufacturer.

B. Unless otherwise indicated, support units on a level bed of crushed stone or gravel, graded from 1/2-inch sieve to No. 4 sieve and compacted to same density as adjacent undisturbed earth.

C. Field-cut openings for ducts and conduits according to enclosure manufacturer's written instructions. Cut wall of enclosure with a tool designed for material to be cut. Size holes for terminating fittings to be used, and seal around penetrations after fittings are installed.

3.6 GROUNDING

A. Ground underground ducts according to Section 260526 "Grounding and Bonding for Electrical Systems."

3.7 FIELD QUALITY CONTROL

A. Perform the following tests and inspections and prepare test reports:

1. Demonstrate capability and compliance with requirements on completion of installation of underground ducts.
2. Pull mandrel through duct to prove joint integrity and test for out-of-round duct. Provide mandrel equal to 80 percent fill of duct. If obstructions are indicated, remove obstructions and retest.
3. Test grounding to ensure electrical continuity of grounding and bonding connections. Measure and report ground resistance as specified in Section 260526 "Grounding and Bonding for Electrical Systems."

B. Correct deficiencies and retest as specified above to demonstrate compliance.

3.8 CLEANING

A. Pull leather-washer-type duct cleaner, with graduated washer sizes, through full length of ducts. Follow with rubber duct swab for final cleaning and to assist in spreading lubricant throughout ducts.

B. Clean internal surfaces of vault, including sump. Remove foreign material.

END OF SECTION 260543

SECTION 260553 - IDENTIFICATION FOR ELECTRICAL SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General, Special, and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Identification for raceways.
2. Identification of power and control cables.
3. Identification for conductors.
4. Underground-line warning tape.
5. Warning labels and signs.
6. Instruction signs.
7. Equipment identification labels.
8. Miscellaneous identification products.

1.3 QUALITY ASSURANCE

A. Comply with ANSI A13.1 and IEEE C2.

B. Comply with NFPA 70.

C. Comply with 29 CFR 1910.144 and 29 CFR 1910.145.

D. Comply with ANSI Z535.4 for safety signs and labels.

E. Adhesive-attached labeling materials, including label stocks, laminating adhesives, and inks used by label printers, shall comply with UL 969.

1.4 COORDINATION

A. Coordinate identification names, abbreviations, colors, and other features with requirements in other Sections requiring identification applications, Drawings, Shop Drawings, manufacturer's wiring diagrams, and the Operation and Maintenance Manual; and with those required by codes, standards, and 29 CFR 1910.145. Use consistent designations throughout Project.

B. Coordinate installation of identifying devices with completion of covering and painting of surfaces where devices are to be applied.

C. Coordinate installation of identifying devices with location of access panels and doors.

D. Install identifying devices before installing acoustical ceilings and similar concealment.

PART 2 - PRODUCTS

2.1 POWER RACEWAY IDENTIFICATION MATERIALS

A. Comply with ANSI A13.1 for minimum size of letters for legend and for minimum length of color field for each raceway size.

B. Colors for Raceways Carrying Circuits at 600 V or Less:

1. Black letters on a white field.
2. Legend: Indicate voltage and system or service type.

C. Self-Adhesive Vinyl Labels for Raceways Carrying Circuits at 600 V or Less: Preprinted, flexible label laminated with a clear, weather- and chemical-resistant coating and matching wraparound adhesive tape for securing ends of legend label.

D. Snap-Around Labels for Raceways Carrying Circuits at 600 V or Less: Slit, pre-tensioned, flexible, preprinted, color-coded acrylic sleeve, with diameter sized to suit diameter of raceway or cable it identifies and to stay in place by gripping action.

E. Snap-Around, Color-Coding Bands for Raceways Carrying Circuits at 600 V or Less: Slit, pre-tensioned, flexible, solid-colored acrylic sleeve, 2 inches long, with diameter sized to suit diameter of raceway or cable it identifies and to stay in place by gripping action.

F. Metal Tags: Brass or aluminum, 2 by 2 by 0.05 inch, with stamped legend, punched for use with self-locking cable tie fastener.

G. Write-On Tags: Polyester tag, 0.010 inch thick, with corrosion-resistant grommet and cable tie for attachment to conductor or cable.

1. Marker for Tags: Permanent, waterproof, black ink marker recommended by tag manufacturer.
2. Marker for Tags: Machine-printed, permanent, waterproof, black ink marker recommended by printer manufacturer.

2.2 POWER AND CONTROL CABLE IDENTIFICATION MATERIALS

A. Comply with ANSI A13.1 for minimum size of letters for legend and for minimum length of color field for each raceway and cable size.

B. Self-Adhesive Vinyl Labels: Preprinted, flexible label laminated with a clear, weather- and chemical-resistant coating and matching wraparound adhesive tape for securing ends of legend label.

C. Metal Tags: Brass or aluminum, 2 by 2 by 0.05 inch, with stamped legend, punched for use with self-locking cable tie fastener.

D. Write-On Tags: Polyester tag, 0.010 inch thick, with corrosion-resistant grommet and cable tie for attachment to conductor or cable.

1. Marker for Tags: Permanent, waterproof, black ink marker recommended by tag manufacturer.
2. Marker for Tags: Machine-printed, permanent, waterproof, black ink marker recommended by printer manufacturer.

E. Snap-Around Labels: Slit, pre-tensioned, flexible, preprinted, color-coded acrylic sleeve, with diameter sized to suit diameter of raceway or cable it identifies and to stay in place by gripping action.

F. Snap-Around, Color-Coding Bands: Slit, pre-tensioned, flexible, solid-colored acrylic sleeve, 2 inches long, with diameter sized to suit diameter of raceway or cable it identifies and to stay in place by gripping action.

2.3 CONDUCTOR IDENTIFICATION MATERIALS

A. Color-Coding Conductor Tape: Colored, self-adhesive vinyl tape not less than 3 mils thick by 1 to 2 inches wide.

B. Self-Adhesive Vinyl Labels: Preprinted, flexible label laminated with a clear, weather- and chemical-resistant coating and matching wraparound adhesive tape for securing ends of legend label.

C. Snap-Around Labels: Slit, pre-tensioned, flexible, preprinted, color-coded acrylic sleeve, with diameter sized to suit diameter of raceway or cable it identifies and to stay in place by gripping action.

D. Snap-Around, Color-Coding Bands: Slit, pre-tensioned, flexible, solid-colored acrylic sleeve, 2 inches long, with diameter sized to suit diameter of raceway or cable it identifies and to stay in place by gripping action.

E. Marker Tapes: Vinyl or vinyl-cloth, self-adhesive wraparound type, with circuit identification legend machine printed by thermal transfer or equivalent process.

F. Write-On Tags: Polyester tag, 0.010 inch thick, with corrosion-resistant grommet and cable tie for attachment to conductor or cable.

1. Marker for Tags: Permanent, waterproof, black ink marker recommended by tag manufacturer.
2. Marker for Tags: Machine-printed, permanent, waterproof, black ink marker recommended by printer manufacturer.

2.4 UNDERGROUND-LINE WARNING TAPE

A. Tape:

1. Recommended by manufacturer for the method of installation and suitable to identify and locate underground electrical and communications utility lines.

2. Printing on tape shall be permanent and shall not be damaged by burial operations.
3. Tape material and ink shall be chemically inert, and not subject to degrading when exposed to acids, alkalis, and other destructive substances commonly found in soils.

B. Color and Printing:

1. Comply with ANSI Z535.1 through ANSI Z535.5.
2. Inscriptions for Red-Colored Tapes: ELECTRIC LINE, HIGH VOLTAGE.

C. Tag:

1. Reinforced, detectable three-layer laminate, consisting of a printed pigmented woven scrim, a solid aluminum-foil core, and a clear protective film that allows inspection of the continuity of the conductive core, bright-colored, continuous-printed on one side with the inscription of the utility, compounded for direct-burial service.
2. Overall Thickness: 8 mils.
3. Foil Core Thickness: 0.35 mil.
4. Weight: 34 lb/1000 sq. ft.
5. 3-Inch Tensile According to ASTM D 882: 300 lbf, and 12,500 psi.

2.5 WARNING LABELS AND SIGNS

A. Comply with NFPA 70 and 29 CFR 1910.145.

B. Self-Adhesive Warning Labels: Factory-printed, multicolor, pressure-sensitive adhesive labels, configured for display on front cover, door, or other access to equipment unless otherwise indicated.

C. Baked-Enamel Warning Signs:

1. Preprinted aluminum signs, punched or drilled for fasteners, with colors, legend, and size required for application.
2. 1/4-inch grommets in corners for mounting.
3. Nominal size, 7 by 10 inches.

D. Metal-Backed, Butyrate Warning Signs:

1. Weather-resistant, nonfading, preprinted, cellulose-acetate butyrate signs with 0.0396-inch galvanized-steel backing; and with colors, legend, and size required for application.
2. 1/4-inch grommets in corners for mounting.
3. Nominal size, 10 by 14 inches.

E. Warning label and sign shall include, but are not limited to, the following legends:
1. Workspace Clearance Warning: "WARNING - OSHA REGULATION - AREA IN FRONT OF ELECTRICAL EQUIPMENT MUST BE KEPT CLEAR FOR 36 INCHES" (for 208V systems) "48 INCHES" (for 480V systems).

2.6 EQUIPMENT IDENTIFICATION LABELS

A. Adhesive Film Label: Machine printed, in black, by thermal transfer or equivalent process. Minimum letter height shall be 3/8 inch.

B. Adhesive Film Label with Clear Protective Overlay: Machine printed, in black, by thermal transfer or equivalent process. Minimum letter height shall be 3/8 inch. Overlay shall provide a weatherproof and UV-resistant seal for label.

C. Self-Adhesive, Engraved, Laminated Acrylic or Melamine Label: Adhesive backed, with white letters on a dark-gray background. Minimum letter height shall be 3/8 inch.

D. Engraved, Laminated Acrylic or Melamine Label: Punched or drilled for screw mounting. White letters on a dark-gray background. Minimum letter height shall be 3/8 inch.

2.7 CABLE TIES

A. UV-Stabilized Cable Ties: Fungus inert, designed for continuous exposure to exterior sunlight, self extinguishing, one piece, self locking, Type 6/6 nylon.

1. Minimum Width: 3/16 inch.
2. Tensile Strength at 73 deg F, According to ASTM D 638: 12,000 psi.
3. Temperature Range: Minus 40 to plus 185 deg F.
4. Color: Black.

2.8 MISCELLANEOUS IDENTIFICATION PRODUCTS

A. Paint: Comply with requirements in painting Sections for paint materials and application requirements. Select paint system applicable for surface material and location (exterior or interior).

B. Fasteners for Labels and Signs: Self-tapping, stainless-steel screws or stainless-steel machine screws with nuts and flat and lock washers.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Verify identity of each item before installing identification products.

B. Location: Install identification materials and devices at locations for most convenient viewing without interference with operation and maintenance of equipment.

C. Apply identification devices to surfaces that require finish after completing finish work.

D. Self-Adhesive Identification Products: Clean surfaces before application, using materials and methods recommended by manufacturer of identification device.

E. Attach signs and plastic labels that are not self-adhesive type with mechanical fasteners appropriate to the location and substrate.

F. System Identification Color-Coding Bands for Raceways and Cables: Each color-coding band shall completely encircle cable or conduit. Place adjacent bands of two-color markings in contact, side by side. Locate bands at changes in direction, at penetrations of walls and floors, at 50-foot maximum intervals in straight runs, and at 25-foot maximum intervals in congested areas.

G. Aluminum Wraparound Marker Labels and Metal Tags: Secure tight to surface of conductor or cable at a location with high visibility and accessibility.

H. Cable Ties: For attaching tags. Outdoors: UV-stabilized nylon.

I. Underground-Line Warning Tape: During backfilling of trenches install continuous underground-line warning tape directly above line at 6 to 8 inches below finished grade. Use multiple tapes where width of multiple lines installed in a common trench or concrete envelope exceeds 16 inches overall.

3.2 IDENTIFICATION SCHEDULE

A. Accessible Raceways, 600 V or Less, for Service, Feeder, and Branch Circuits More Than 30 A, and 120 V to ground: Identify with self-adhesive vinyl label or self-adhesive vinyl tape applied in bands. Install labels at 10-foot maximum intervals.

B. Power-Circuit Conductor Identification, 600 V or Less: For conductors in vaults, pull and junction boxes, use color-coding conductor tape to identify the phase.

1. Color-Coding for Phase and Voltage Level Identification, 600 V or Less: Use colors listed below for ungrounded service, feeder and branch-circuit conductors.

a. Color shall be factory applied or field applied for sizes larger than No. 8 AWG, if authorities having jurisdiction permit.
b. Colors for 208/120-V Circuits:

1. Phase A: Black.
2. Phase B: Red.
3. Phase C: Blue.

c. Field-Applied, Color-Coding Conductor Tape: Apply in half-lapped turns for a minimum distance of 6 inches from terminal points and in boxes where splices or taps are made. Apply last two turns of tape with no tension to prevent possible unwinding. Locate bands to avoid obscuring factory cable markings.

C. Install instructional sign including the color-code for grounded and ungrounded conductors using adhesive-film-type labels.

D. Conductors to Be Extended in the Future: Attach write-on tags to conductors and list source.

E. Locations of Underground Lines: Identify with underground-line warning tape for power, lighting, communication, and control wiring.

1. Limit use of underground-line warning tape to direct-buried cables.
2. Install underground-line warning tape for both direct-buried cables and cables in raceway.

F. Warning Labels for Indoor Cabinets, Boxes, and Enclosures for Power and Lighting: Self-adhesive warning labels.

1. Comply with 29 CFR 1910.145.
2. Identify system voltage with black letters on an orange background.
3. Apply to exterior of door, cover, or other access.
4. For equipment with multiple power or control sources, apply to door or cover of equipment including, but not limited to, the following:
    a. Controls with external control power connections.

G. Operating Instruction Signs: Install instruction signs to facilitate proper operation and maintenance of electrical systems and items to which they connect. Install instruction signs with approved legend where instructions are needed for system or equipment operation.

H. Equipment Identification Labels: On each unit of equipment, install unique designation label that is consistent with wiring diagrams, schedules, and the Operation and Maintenance Manual. Apply labels to disconnect switches and protection equipment, central or master units, control panels, control stations, terminal cabinets of each system. Systems include power, lighting, and control systems unless equipment is provided with its own identification.

1. Labeling Instructions:
    a. Panelboards: Self-adhesive, engraved, laminated acrylic or melamine label. Unless otherwise indicated, provide a single line of text with 1/2-inch- (13-mm-) high letters on 1-1/2-inch- (38-mm-) high label; where two lines of text are required, use labels 2 inches (50 mm) high.
    b. Outdoor Equipment: Engraved, laminated acrylic or melamine label.
    c. Unless provided with self-adhesive means of attachment, fasten labels with appropriate mechanical fasteners that do not change the NEMA or NRTL rating of the enclosure.

2. Equipment to Be Labeled:

    a. Panelboards: Typewritten directory of circuits in the location provided by panelboard manufacturer. Directory shall list what the breaker serves. Panelboard identification shall be self-adhesive, engraved, laminated acrylic or melamine label.
    b. Enclosures and electrical cabinets.
    c. Enclosed switches.
    d. Enclosed circuit breakers.
    e. Contactors.

END OF SECTION 260553

SECTION 260923 - LIGHTING CONTROL DEVICES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General, Special and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Photoelectric switches.

1.3 INFORMATIONAL SUBMITTALS

A. Field quality-control reports.

1.4 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For each type of lighting control device to include in emergency, operation, and maintenance manuals.

PART 2 - PRODUCTS

2.1 OUTDOOR PHOTOELECTRIC SWITCHES

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Intermatic, Inc.
2. NSi Industries LLC; TORK Products.

B. Description: Solid state, with SPST dry contacts rated for 1000-VA inductive, to operate connected relay, contactor coils, or microprocessor input; complying with UL 773A.

1. Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
2. Light-Level Monitoring Range: 1.5 to 10 fc (16.14 to 108 lux), with an adjustment for turn-on and turn-off levels within that range, and a directional lens in front of the photocell to prevent fixed light sources from causing turn-off.
3. Time Delay: Fifteen second minimum, to prevent false operation.
4. Surge Protection: Metal-oxide varistor.

5. Mounting: Twist lock complies with NEMA C136.10, with base-and-stem mounting or stem-and-swivel mounting accessories as required to direct sensor to the north sky exposure.
6. Voltage rating as required to connect into lighting control system.

2.2 CONDUCTORS AND CABLES

A. Power Wiring to Supply Side of Remote-Control Power Sources: Not smaller than No. 12 AWG. Comply with requirements in Section 260519 "Low-Voltage Electrical Power Conductors and Cables."

B. Control Cable: Multi-conductor cable with stranded-copper conductors not smaller than recommended by lighting control system manufacturer.

PART 3 - EXECUTION

3.1 WIRING INSTALLATION

A. Wiring Method: Comply with Section 260519 "Low-Voltage Electrical Power Conductors and Cables." Minimum conduit size is 3/4 inch.

B. Wiring within Enclosures: Comply with NECA 1. Separate power-limited and non-power-limited conductors according to conductor manufacturer's written instructions.

C. Size conductors according to lighting control device manufacturer's written instructions unless otherwise indicated.

D. Splices, Taps, and Terminations: Make connections only on numbered terminal strips in junction, pull, and outlet boxes; terminal cabinets; and equipment enclosures.

3.2 IDENTIFICATION

A. Identify components and power and control wiring according to Section 260553 "Identification for Electrical Systems."

1. Identify controlled circuits in lighting contactors.
2. Identify circuits or luminaires controlled by photoelectric.

B. Label time switches and contactors with a unique designation.

3.3 FIELD QUALITY CONTROL

A. Manufacturer's Field Service: Engage a factory-authorized service representative to test and inspect components, assemblies, and equipment installations, including connections.

B. Perform the following tests and inspections with the assistance of a factory-authorized service representative:

1. Operational Test: After installing time switches and sensors, and after electrical circuitry has been energized, start units to confirm proper unit operation.
2. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

C. Lighting control devices will be considered defective if they do not pass tests and inspections.

D. Prepare test and inspection reports.

3.4 DEMONSTRATION

A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain lighting control devices.

END OF SECTION 260923

SECTION 262813 - FUSES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General, Special and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Cartridge fuses rated 600-V ac and less for use in control circuits, enclosed switches, and enclosed controllers.

1.3 MAINTENANCE MATERIAL

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Fuses: Equal to one (1) set for every five (5) installed, but no fewer than three (3) of each size and type.

1.4 QUALITY ASSURANCE

A. Source Limitations: Obtain fuses, for use within a specific product or circuit, from single source from single manufacturer.

B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

C. Comply with NEMA FU 1 for cartridge fuses.

D. Comply with NFPA 70.

1.5 PROJECT CONDITIONS

A. Where ambient temperature to which fuses are directly exposed is less than 40 deg F or more than 100 deg F, apply manufacturer's ambient temperature adjustment factors to fuse ratings.

1.6 COORDINATION

A. Coordinate fuse ratings with utilization equipment nameplate limitations of maximum fuse size and with system short-circuit current levels.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Cooper Bussmann, Inc.
2. Edison Fuse, Inc.
3. Ferraz Shawmut, Inc.
4. Littelfuse, Inc.

2.2 CARTRIDGE FUSES

A. Characteristics: NEMA FU 1, nonrenewable cartridge fuses with voltage ratings consistent with circuit voltages.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine fuses before installation. Reject fuses that are moisture damaged or physically damaged.

B. Examine holders to receive fuses for compliance with installation tolerances and other conditions affecting performance, such as rejection features.

C. Examine utilization equipment nameplates and installation instructions. Install fuses of sizes and with characteristics appropriate for each piece of equipment.

D. Evaluate ambient temperatures to determine if fuse rating adjustment factors must be applied to fuse ratings.

E. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 FUSE APPLICATIONS

A. Cartridge Fuses:
1. Other Branch Circuits: Class RK5, time delay.
2. Control Circuits: Class CC, fast acting.

3.3 INSTALLATION

A. Install fuses in fusible devices. Arrange fuses so rating information is readable without removing fuse.

3.4 IDENTIFICATION

A. Install labels complying with requirements for identification specified in Section 260553 "Identification for Electrical Systems" and indicating fuse replacement information on inside door of each fused switch and adjacent to each fuse block, socket, and holder.

END OF SECTION 262813

SECTION 262816 - ENCLOSED SWITCHES AND CIRCUIT BREAKERS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General, Special and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Fusible switches.
2. Nonfusible switches.
3. Molded-case circuit breakers (MCCBs).
4. Enclosures.

1.3 DEFINITIONS

A. NC: Normally closed.

B. NO: Normally open.

C. SPDT: Single pole, double throw.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of enclosed switch, circuit breaker, accessory, and component indicated. Include dimensioned elevations, sections, weights, and manufacturers' technical data on features, performance, electrical characteristics, ratings, accessories, and finishes.

1. Enclosure types and details for types other than NEMA 250, Type 1.
2. Current and voltage ratings.
3. Short-circuit current ratings (interrupting and withstand, as appropriate).
4. Include evidence of NRTL listing for series rating of installed devices.
5. Detail features, characteristics, ratings, and factory settings of individual overcurrent protective devices, accessories, and auxiliary components.
6. Include time-current coordination curves (average melt) for each type and rating of overcurrent protective device; include selectable ranges for each type of overcurrent protective device.

B. Shop Drawings: For enclosed switches and circuit breakers. Include plans, elevations, sections, details, and attachments to other work.

1. Wiring Diagrams: For power, signal, and control wiring.

1.5 INFORMATIONAL SUBMITTALS

A. Qualification Data: For qualified testing agency.

B. Field quality-control reports.

1. Test procedures used.
2. Test results that comply with requirements.
3. Results of failed tests and corrective action taken to achieve test results that comply with requirements.

C. Manufacturer's field service report.

1.6 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For enclosed switches and circuit breakers to include in emergency, operation, and maintenance manuals. Include the following:

1. Manufacturer's written instructions for testing and adjusting enclosed switches and circuit breakers.
2. Time-current coordination curves (average melt) for each type and rating of overcurrent protective device; include selectable ranges for each type of overcurrent protective device.

1.7 QUALITY ASSURANCE

A. Source Limitations: Obtain enclosed switches and circuit breakers, overcurrent protective devices, components, and accessories, within same product category, from single source from single manufacturer.

B. Product Selection for Restricted Space: Drawings indicate maximum dimensions for enclosed switches and circuit breakers, including clearances between enclosures, and adjacent surfaces and other items. Comply with indicated maximum dimensions.

C. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

D. Comply with NFPA 70.

1.8 PROJECT CONDITIONS

A. Environmental Limitations: Rate equipment for continuous operation under the following conditions unless otherwise indicated:

1. Ambient Temperature: Not less than minus 22 deg F and not exceeding 104 deg F.
2. Altitude: Not exceeding 6600 feet.

1.9 COORDINATION

A. Coordinate layout and installation of switches, circuit breakers, and components with equipment served and adjacent surfaces. Maintain required workspace clearances and required clearances for equipment access doors and panels.

PART 2 - PRODUCTS

2.1 FUSIBLE SWITCHES

A. Manufacturer: Square D; a brand of Schneider Electric, or Siemens.

B. Type HD, Heavy Duty, Single Throw, 240-V ac, 1200 A and Smaller: UL 98 and NEMA KS 1, horsepower rated, with clips or bolt pads to accommodate required fuses, lockable handle with capability to accept three padlocks, and interlocked with cover in closed position.

C. Accessories:

1. Equipment Ground Kit: Internally mounted and labeled for copper and aluminum ground conductors.
2. Neutral Kit: Internally mounted; insulated, capable of being grounded and bonded; labeled for copper and aluminum neutral conductors.
3. Class R Fuse Kit: Provides rejection of other fuse types when Class R fuses are specified.
4. Hookstick Handle: Allows use of a hookstick to operate the handle.
5. Lugs: Mechanical or Compression type, suitable for number, size, and conductor material.
6. Service-Rated Switches: Labeled for use as service equipment.

2.2 NONFUSIBLE SWITCHES

A. Manufacturer: Square D; a brand of Schneider Electric, or Siemens.

B. Type HD, Heavy Duty, Single Throw, 240-V ac, 1200 A and Smaller: UL 98 and NEMA KS 1, horsepower rated, lockable handle with capability to accept three padlocks, and interlocked with cover in closed position.

C. Accessories:

1. Equipment Ground Kit: Internally mounted and labeled for copper and aluminum ground conductors.
2. Neutral Kit: Internally mounted; insulated, capable of being grounded and bonded; labeled for copper and aluminum neutral conductors.
3. Hookstick Handle: Allows use of a hookstick to operate the handle.
4. Lugs: Mechanical or Compression type, suitable for number, size, and conductor material.

2.3 MOLDED-CASE CIRCUIT BREAKERS

A. Manufacturer: Square D; a brand of Schneider Electric, or Siemens.

B. General Requirements: Comply with UL 489, NEMA AB 1, and NEMA AB 3, with interrupting capacity to comply with available fault currents.

C. Thermal-Magnetic Circuit Breakers: Inverse time-current element for low-level overloads and instantaneous magnetic trip element for short circuits. Adjustable magnetic trip setting for circuit-breaker frame sizes 250 A and larger.

D. Current-Limiting Circuit Breakers: Frame sizes 400 A and smaller, and let-through ratings less than NEMA FU 1, RK-5.

E. Ground-Fault, Circuit-Interrupter (GFCI) Circuit Breakers: Single- and two-pole configurations with Class A ground-fault protection (6-mA trip).

F. Ground-Fault, Equipment-Protection (GFEP) Circuit Breakers: With Class B ground-fault protection (30-mA trip).

G. Features and Accessories:

1. Standard frame sizes, trip ratings, and number of poles.
2. Lugs: Mechanical or Compression type, suitable for number, size, trip ratings, and conductor material.
3. Application Listing: Appropriate for application; Type SWD for switching fluorescent lighting loads; Type HID for feeding fluorescent and high-intensity discharge lighting circuits.

2.4 ENCLOSURES

A. Enclosed Switches and Circuit Breakers: NEMA AB 1, NEMA KS 1, NEMA 250, and UL 50, to comply with environmental conditions at installed location.
1. Outdoor Locations: NEMA 250, Type 3R.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine elements and surfaces to receive enclosed switches and circuit breakers for compliance with installation tolerances and other conditions affecting performance of the Work.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Install individual wall-mounted switches and circuit breakers with tops at uniform height unless otherwise indicated.

B. Temporary Lifting Provisions: Remove temporary lifting eyes, channels, and brackets and temporary blocking of moving parts from enclosures and components.

C. Install fuses in fusible devices.

D. Comply with NECA 1.

3.3 IDENTIFICATION

A. Comply with requirements in Section 260553 "Identification for Electrical Systems."

1. Identify field-installed conductors, interconnecting wiring, and components; provide warning signs.
2. Label each enclosure with engraved metal or laminated-plastic nameplate.

3.4 FIELD QUALITY CONTROL

A. Acceptance Testing Preparation:

1. Test insulation resistance for each enclosed switch and circuit breaker, component, connecting supply, feeder, and control circuit.
2. Test continuity of each circuit.

B. Tests and Inspections:

1. Perform each visual and mechanical inspection and electrical test stated in NETA Acceptance Testing Specification. Certify compliance with test parameters.
2. Correct malfunctioning units on-site, where possible, and retest to demonstrate compliance; otherwise, replace with new units and retest.
3. Test and adjust controls, remote monitoring, and safeties. Replace damaged and malfunctioning controls and equipment.

C. Enclosed switches and circuit breakers will be considered defective if they do not pass tests and inspections.

D. Prepare test and inspection reports, including a certified report that identifies enclosed switches and circuit breakers and that describes scanning results. Include notation of deficiencies detected, remedial action taken, and observations after remedial action.

3.5 ADJUSTING

A. Adjust moving parts and operable components to function smoothly, and lubricate as recommended by manufacturer.

END OF SECTION 262816

SECTION 265600 - EXTERIOR LIGHTING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General, Special and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Exterior luminaires.
2. Poles and accessories.

1.3 DEFINITIONS

A. CRI: Color-rendering index.

B. LER: Luminaire efficacy rating.

C. Luminaire: Complete lighting fixture.

D. Pole: Luminaire support structure.

E. Standard: Same definition as "Pole" above.

1.4 ACTION SUBMITTALS

A. Product Data: For each luminaire, pole, and support component, arranged in order of lighting unit designation. Include data on features, accessories, finishes, and the following:

1. Physical description of luminaire, including materials, dimensions, effective projected area, and verification of indicated parameters.
2. Details of attaching luminaires and accessories.
3. Details of installation and construction.
4. Luminaire materials.
5. Photometric data based on laboratory tests of each luminaire type, complete with indicated lamps, ballasts, and accessories.

    a. Testing Agency Certified Data: For indicated luminaires, photometric data shall be certified by a qualified independent testing agency. Photometric data for remaining luminaires shall be certified by manufacturer.

b. Manufacturer Certified Data: Photometric data shall be certified by manufacturer's laboratory with a current accreditation under the National Voluntary Laboratory Accreditation Program for Energy Efficient Lighting Products.

6. Lamps, including life, output, CRI, lumens, and energy-efficiency data.
7. Materials, dimensions, and finishes of poles.
8. Means of attaching luminaires to supports, and indication that attachment is suitable for components involved.
9. Anchor bolts for poles.
10. Manufactured pole foundations.

B. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work.

1. Detail equipment assemblies and indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
2. Anchor-bolt templates keyed to specific poles and certified by manufacturer.
3. Design calculations, certified by a qualified professional engineer, indicating strength of screw foundations and soil conditions on which they are based.
4. Wiring Diagrams: For power, signal, and control wiring.

C. Samples: For products designated for sample submission in the Exterior Lighting Device Schedule. Each Sample shall include lamps and ballasts.

1.5 INFORMATIONAL SUBMITTALS

A. Pole and Support Component Certificates: Signed by manufacturers of poles, certifying that products are designed for indicated load requirements in AASHTO LTS-4-M and that load imposed by luminaire and attachments has been included in design. The certification shall be based on design calculations by a professional engineer.

B. Qualification Data: For qualified agencies providing photometric data for lighting fixtures.

C. Field quality-control reports.

D. Warranty: Sample of special warranty.

1.6 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For luminaires and poles to include in emergency, operation, and maintenance manuals.

1.7 QUALITY ASSURANCE

A. Luminaire Photometric Data Testing Laboratory Qualifications: Provided by manufacturers' laboratories that are accredited under the National Volunteer Laboratory Accreditation Program for Energy Efficient Lighting Products.

B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

C. Comply with IEEE C2, "National Electrical Safety Code."

D. Comply with NFPA 70.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Package aluminum poles for shipping according to ASTM B 660.

B. Store poles on decay-resistant-treated skids at least 12 inches (300 mm) above grade and vegetation. Support poles to prevent distortion and arrange to provide free air circulation.

C. Retain factory-applied pole wrappings on metal poles until right before pole installation. For poles with nonmetallic finishes, handle with web fabric straps.

1.9 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace products that fail in materials or workmanship; that corrode; or that fade, stain, perforate, erode, or chalk due to effects of weather or solar radiation within specified warranty period. Manufacturer may exclude lightning damage, hail damage, vandalism, abuse, or unauthorized repairs or alterations from special warranty coverage.

1. Warranty Period for Luminaires: Five years from date of Substantial Completion.
2. Warranty Period for Metal Corrosion: Five years from date of Substantial Completion.
3. Warranty Period for Color Retention: Five years from date of Substantial Completion.
4. Warranty Period for Poles: Repair or replace lighting poles and standards that fail in finish, materials, and workmanship within manufacturer's standard warranty period, but not less than three years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Products: Subject to compliance with requirements, provide product indicated on Drawings.

2.2 GENERAL REQUIREMENTS FOR LUMINAIRES

A. Luminaires shall comply with UL 1598 and be listed and labeled for installation in wet locations by an NRTL acceptable to authorities having jurisdiction.

B. Lateral Light Distribution Patterns: Comply with IESNA RP-8 for parameters of lateral light distribution patterns indicated for luminaires.

C. Metal Parts: Free of burrs and sharp corners and edges.

D. Sheet Metal Components: Corrosion-resistant aluminum unless otherwise indicated. Form and support to prevent warping and sagging.

E. Housings: Rigidly formed, weather- and light-tight enclosures that will not warp, sag, or deform in use. Provide filter/breather for enclosed luminaires.

F. Doors, Frames, and Other Internal Access: Smooth operating, free of light leakage under operating conditions, and designed to permit relamping without use of tools. Designed to prevent doors, frames, lenses, diffusers, and other components from falling accidentally during relamping and when secured in operating position. Doors shall be removable for cleaning or replacing lenses. Designed to disconnect ballast when door opens.

G. Exposed Hardware Material: Stainless steel.

H. Plastic Parts: High resistance to yellowing and other changes due to aging, exposure to heat, and UV radiation.

I. Light Shields: Metal baffles, factory installed and field adjustable, arranged to block light distribution to indicated portion of normally illuminated area or field.

J. Reflecting surfaces shall have minimum reflectance as follows unless otherwise indicated:

1. White Surfaces: 85 percent.
2. Specular Surfaces: 83 percent.
3. Diffusing Specular Surfaces: 75 percent.

K. Lenses and Refractors Gaskets: Use heat- and aging-resistant resilient gaskets to seal and cushion lenses and refractors in luminaire doors.

L. Luminaire Finish: Manufacturer's standard paint applied to factory-assembled and -tested luminaire before shipping. Where indicated, match finish process and color of pole or support materials.

M. Factory-Applied Finish for Aluminum Luminaires: Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

1. Finish designations prefixed by AA comply with the system established by the Aluminum Association for designating aluminum finishes.

2.3 GENERAL REQUIREMENTS FOR POLES AND SUPPORT COMPONENTS

A. Structural Characteristics: Comply with AASHTO LTS-4-M.

1. Wind-Load Strength of Poles: Adequate at indicated heights above grade without failure, permanent deflection, or whipping in steady winds of speed indicated in "Structural Analysis Criteria for Pole Selection" Article.
2. Strength Analysis: For each pole, multiply the actual equivalent projected area of luminaires and brackets by a factor of 1.1 to obtain the equivalent projected area to be used in pole selection strength analysis.

B. Luminaire Attachment Provisions: Comply with luminaire manufacturers' mounting requirements. Use stainless-steel fasteners and mounting bolts unless otherwise indicated.

C. Mountings, Fasteners, and Appurtenances: Corrosion-resistant items compatible with support components.

1. Materials: Shall not cause galvanic action at contact points.
2. Anchor Bolts, Leveling Nuts, Bolt Caps, and Washers: Hot-dip galvanized after fabrication unless otherwise indicated.
3. Anchor-Bolt Template: Plywood or steel.

D. Handhole: Oval-shaped, with minimum clear opening of 2-1/2 by 5 inches (65 by 130 mm), with cover secured by stainless-steel captive screws.

E. Concrete Pole Foundations: Cast in place, with anchor bolts to match pole-base flange. Concrete, reinforcement, and formwork are specified in Section 033000 "Cast-in-Place Concrete."

2.4 ALUMINUM POLES

A. Poles: Seamless, extruded structural tube complying with ASTM B 429/B 429M, Alloy 6063-T6 with access handhole in pole wall.

B. Poles: ASTM B 209 (ASTM B 209M), 5052-H34 marine sheet alloy with access handhole in pole wall.

1. Shape: Square, straight.
2. Mounting Provisions: Butt flange for bolted mounting on foundation or breakaway support.

C. Grounding and Bonding Lugs: Welded 1/2-inch (13-mm) threaded lug, complying with requirements in Section 260526 "Grounding and Bonding for Electrical Systems," listed for attaching grounding and bonding conductors of type and size listed in that Section, and accessible through handhole.

D. Brackets for Luminaires: Detachable, with pole and adapter fittings of cast aluminum. Adapter fitting welded to pole and bracket, then bolted together with stainless-steel bolts.

1. Tapered oval cross section, with straight tubular end section to accommodate luminaire.
2. Finish: Same as pole and luminaire.

E. Aluminum Finish: Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

1. Finish designations prefixed by AA comply with the system established by the Aluminum Association for designating aluminum finishes.

PART 3 - EXECUTION

3.1 LUMINAIRE INSTALLATION

A. Fasten luminaire to indicated structural supports.

1. Use fastening methods and materials selected to resist seismic forces defined for the application and approved by manufacturer.

B. Adjust luminaires that require field adjustment or aiming.

3.2 POLE INSTALLATION

A. Alignment: Align pole foundations and poles for optimum directional alignment of luminaires and their mounting provisions on the pole.

B. Clearances: Maintain the following minimum horizontal distances of poles from surface and underground features unless otherwise indicated on Drawings:

1. Fire Hydrants and Storm Drainage Piping: 60 inches (1520 mm).
2. Water, Gas, Electric, Communication, and Sewer Lines: 10 feet (3 m).
3. Trees: 15 feet (5 m) from tree trunk.

C. Concrete Pole Foundations: Set anchor bolts according to anchor-bolt templates furnished by pole manufacturer. Concrete materials, installation, and finishing requirements are specified in Section 033000 "Cast-in-Place Concrete."

D. Foundation-Mounted Poles: Mount pole with leveling nuts, and tighten top nuts to torque level recommended by pole manufacturer.

1. Use anchor bolts and nuts selected to resist seismic forces defined for the application and approved by manufacturer.
2. Install base covers unless otherwise indicated.

E. Raise and set poles using web fabric slings (not chain or cable).

3.3 CORROSION PREVENTION

A. Aluminum: Do not use in contact with earth or concrete. When in direct contact with a dissimilar metal, protect aluminum by insulating fittings or treatment.

B. Steel Conduits: Comply with Section 260533 "Raceways and Boxes for Electrical Systems." In concrete foundations, wrap conduit with 0.010-inch- (0.254-mm-) thick, pipe-wrapping plastic tape applied with a 50 percent overlap.

3.4 GROUNDING

A. Ground metal poles and support structures according to Section 260526 "Grounding and Bonding for Electrical Systems."

1. Install grounding electrode for each pole unless otherwise indicated.
2. Install grounding conductor pigtail in the base for connecting luminaire to grounding system.

3.5 FIELD QUALITY CONTROL

A. Inspect each installed fixture for damage. Replace damaged fixtures and components.

B. Illumination Observations: Verify normal operation of lighting units after installing luminaires and energizing circuits with normal power source.

1. Verify operation of photoelectric controls.

C. Illumination Tests:

1. Measure light intensities at night. Use photometers with calibration referenced to NIST standards. Comply with the following IESNA testing guide(s):
   a. IESNA LM-64, "Photometric Measurements of Parking Areas."
   b. IESNA LM-72, "Directional Positioning of Photometric Data."

D. Prepare a written report of tests, inspections, observations, and verifications indicating and interpreting results. If adjustments are made to lighting system, retest to demonstrate compliance with standards.

END OF SECTION 265600

SECTION 312000 - EARTH MOVING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including Instructions to Bidders, Introduction, General Conditions, and Scope of Work Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Preparing subgrades for slabs-on-grade, walks, and turf and grasses.
2. Drainage course for concrete slabs-on-grade.
3. Subbase course for concrete walks.
4. Excavating and backfilling trenches for utilities.

B. Related Sections:
1. Division 03 Section "Cast-in-Place Concrete".
2. Divisions 26 Section for installing underground electrical utilities.
3. Division 32 Section "Turf and Grasses" for finish grading in grass areas.

1.3 DEFINITIONS

A. Backfill: Soil material or controlled low-strength material used to fill an excavation.

1. Initial Backfill: Backfill placed beside and over pipe in a trench, including haunches to support sides of pipe.
2. Final Backfill: Backfill placed over initial backfill to fill a trench.

B. Bedding Course: Aggregate layer placed over the excavated subgrade in a trench before laying pipe.

C. Borrow Soil: Satisfactory soil imported from off-site for use as fill or backfill.

D. Drainage Course: Aggregate layer supporting the slab-on-grade that also minimizes upward capillary flow of pore water.

E. Excavation: Removal of material encountered above subgrade elevations and to lines and dimensions indicated.

F. Fill: Soil materials used to raise existing grades.

G. Rock: Rock material in beds, ledges, unstratified masses, conglomerate deposits, and boulders of rock material 3/4 cu. yd. or more in volume that exceed a standard penetration resistance of 100 blows/2 inches when tested by a geotechnical testing agency, according to ASTM D 1586.

H. Structures: Buildings, footings, foundations, retaining walls, slabs, tanks, curbs, mechanical and electrical appurtenances, or other man-made stationary features constructed above or below the ground surface.

I. Subbase Course: Aggregate layer placed between the subgrade and a cement concrete pavement or a cement concrete walk.

J. Subgrade: Uppermost surface of an excavation or the top surface of a fill or backfill immediately below subbase, drainage fill, drainage course, or topsoil materials.

K. Utilities: On-site underground pipes, conduits, ducts, and cables, as well as underground services within buildings.

1.4 PROJECT CONDITIONS

A. Traffic: Minimize interference with adjoining roads, streets, walks, and other adjacent occupied or used facilities during earth moving operations.

1. Do not close or obstruct streets, walks, or other adjacent occupied or used facilities without permission from Owner and authorities having jurisdiction.
2. Provide alternate routes around closed or obstructed traffic ways if required by Owner or authorities having jurisdiction.

B. Utility Locator Service: Notify "PA One Call" for area where Project is located before beginning earth moving operations.

C. The following practices are prohibited within protection zones:

1. Storage of construction materials, debris, or excavated material.
2. Parking vehicles or equipment.
3. Foot traffic.
4. Erection of sheds or structures.
5. Impoundment of water.
6. Excavation or other digging unless otherwise indicated.
7. Attachment of signs to or wrapping materials around trees or plants unless otherwise indicated.

D. Do not direct vehicle or equipment exhaust towards protection zones.

E. Prohibit heat sources, flames, ignition sources, and smoking within or near protection zones.

PART 2 - PRODUCTS

2.1 SOIL MATERIALS

A. General: Provide borrow soil materials when sufficient satisfactory soil materials are not available from excavations.

B. Satisfactory Soils: Soil Classification Groups GW, GP, GM, SW, SP, and SM according to ASTM D 2487 or a combination of these groups; free of rock or gravel larger than 3 inches in any dimension, debris, waste, frozen materials, vegetation, and other deleterious matter.

C. Unsatisfactory Soils: Soil Classification Groups GC, SC, CL, ML, OL, CH, MH, OH, and PT according to ASTM D 2487 or a combination of these groups.

1. Unsatisfactory soils also include satisfactory soils not maintained within 2 percent of optimum moisture content at time of compaction.

D. Subbase Material: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D 2940; with at least 90 percent passing a 1-1/2-inch sieve and not more than 12 percent passing a No. 200 sieve.

E. Base Course: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D 2940; with at least 95 percent passing a 1-1/2-inch sieve and not more than 8 percent passing a No. 200 sieve.

F. Engineered Fill: Naturally or artificially graded mixture of natural or crushed gravel, crushed stone, and natural or crushed sand; ASTM D 2940; with at least 90 percent passing a 1-1/2-inch sieve and not more than 12 percent passing a No. 200 sieve.

G. Bedding Course: PennDOT 2A stone or pea gravel.

H. Drainage Course: Washed, narrowly graded mixture of crushed stone, or crushed or uncrushed gravel; ASSHTO No. 57 or ASTM D 448; coarse-aggregate grading Size 67; with 100 percent passing a 1-1/2-inch sieve and 0 to 5 percent passing a No. 8 sieve.

I. Filter Material: Narrowly graded mixture of natural or crushed gravel, or crushed stone and natural sand; ASTM D 448; coarse-aggregate grading Size 67; with 100 percent passing a 1-inch sieve and 0 to 5 percent passing a No. 4 sieve.

J. Sand: ASTM C 33; fine aggregate.

K. Impervious Fill: Clayey gravel and sand mixture capable of compacting to a dense state.

2.2 TOPSOIL

A. Acceptable topsoil will be stockpiled for re-use. If quantity of stockpiled topsoil is insufficient, provide (at no additional cost) additional topsoil as required to complete work.

2.3 ACCESSORIES

A. Detectable Warning Tape: Acid- and alkali-resistant, polyethylene film warning tape manufactured for marking and identifying underground utilities, a minimum of 6 inches wide and 4 mils thick, continuously inscribed with a description of the utility, with metallic core encased in a protective jacket for corrosion protection, detectable by metal detector when tape is buried up to 30 inches deep; colored as follows:

1. Red: Electric.

2. Yellow: Gas, oil, steam, and dangerous materials.
3. Orange: Telephone and other communications.
4. Blue: Water systems.
5. Green: Sewer systems.

PART 3 - EXECUTION

3.1 PREPARATION

A. Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards created by earth moving operations.

B. Protect and maintain erosion and sedimentation controls during earth moving operations.

C. Protect subgrades and foundation soils from freezing temperatures and frost. Remove temporary protection before placing subsequent materials.

3.2 DEWATERING

A. Prevent surface water and ground water from entering excavations, from ponding on prepared subgrades, and from flooding Project site and surrounding area.

B. Protect subgrades from softening, undermining, washout, and damage by rain or water accumulation.

1. Reroute surface water runoff away from excavated areas. Do not allow water to accumulate in excavations. Do not use excavated trenches as temporary drainage ditches.

3.3 EXPLOSIVES

A. Explosives: Do not use explosives.

3.4 EXCAVATION, GENERAL

A. Unclassified Excavation: Excavate to subgrade elevations regardless of the character of surface and subsurface conditions encountered. Unclassified excavated materials may include rock, soil materials, and obstructions. No changes in the Contract Sum or the Contract Time will be authorized for rock excavation or removal of obstructions.

1. If excavated materials intended for fill and backfill include unsatisfactory soil materials and rock, replace with satisfactory soil materials.
2. Remove rock to lines and grades indicated to permit installation of permanent construction without exceeding the following dimensions:

a. 24 inches outside of concrete forms other than at footings.
b. 12 inches outside of concrete forms at footings.

c. 6 inches outside of minimum required dimensions of concrete cast against grade.
d. Outside dimensions of concrete walls indicated to be cast against rock without forms or exterior waterproofing treatments.
e. 6 inches beneath bottom of concrete slabs-on-grade.
f. 6 inches beneath pipe in trenches, and the greater of 24 inches wider than pipe or 42 inches wide.

3.5 EXCAVATION FOR STRUCTURES

A. Excavate to indicated elevations and dimensions within a tolerance of plus or minus 1 inch. If applicable, extend excavations a sufficient distance from structures for placing and removing concrete formwork, for installing services and other construction, and for inspections.

1. Excavations for Footings and Foundations: Do not disturb bottom of excavation. Excavate by hand to final grade just before placing concrete reinforcement. Trim bottoms to required lines and grades to leave solid base to receive other work.
2. Excavation for Electrical Utility Structures: Excavate to elevations and dimensions indicated within a tolerance of plus or minus 1 inch. Do not disturb bottom of excavations intended as bearing surfaces.

B. Excavations at Edges of Tree- and Plant-Protection Zones:

1. Excavate by hand to indicated lines, cross sections, elevations, and subgrades. Use narrow-tine spading forks to comb soil and expose roots. Do not break, tear, or chop exposed roots. Do not use mechanical equipment that rips, tears, or pulls roots.

3.6 EXCAVATION FOR WALKS AND PAVEMENTS

A. Excavate surfaces under walks and pavements to indicated lines, cross sections, elevations, and subgrades.

3.7 EXCAVATION FOR UTILITY TRENCHES

A. Excavate trenches to indicated gradients, lines, depths, and elevations.

1. Beyond building perimeter, excavate trenches to allow installation of top of pipe below frost line.

B. Excavate trenches to uniform widths to provide the following clearance on each side of pipe or conduit. Excavate trench walls vertically from trench bottom to 12 inches higher than top of pipe or conduit unless otherwise indicated.

1. Clearance: 12 inches each side of pipe or conduit.

C. Trench Bottoms: Excavate and shape trench bottoms to provide uniform bearing and support of pipes and conduit. Shape subgrade to provide continuous support for bells, joints, and barrels of pipes and for joints, fittings, and bodies of conduits. Remove projecting stones and sharp objects along trench subgrade.

1. For pipes and conduit less than 6 inches in nominal diameter, hand-excavate trench bottoms and support pipe and conduit on an undisturbed subgrade.
2. For flat-bottomed, multiple-duct conduit units, hand-excavate trench bottoms and support conduit on an undisturbed subgrade.
3. Excavate trenches 6 inches deeper than elevation required in rock or other unyielding bearing material to allow for bedding course.

D. Trench Bottoms: Excavate trenches 4 inches deeper than bottom of pipe and conduit elevations to allow for bedding course. Hand-excavate deeper for bells of pipe.

1. Excavate trenches 6 inches deeper than elevation required in rock or other unyielding bearing material to allow for bedding course at no additional cost to the Owner.

E. Trenches in Tree- and Plant-Protection Zones:

1. Hand-excavate to indicated lines, cross sections, elevations, and subgrades. Use narrow-tine spading forks to comb soil and expose roots. Do not break, tear, or chop exposed roots. Do not use mechanical equipment that rips, tears, or pulls roots.
2. Do not cut main lateral roots or taproots; cut only smaller roots that interfere with installation of utilities.

3.8 UNAUTHORIZED EXCAVATION

A. Fill unauthorized excavation under foundations or wall footings by extending bottom elevation of concrete foundation or footing to excavation bottom, without altering top elevation. Lean concrete fill, with 28-day compressive strength of 2500 psi, may be used.

1. Fill unauthorized excavations under other construction, pipe, or conduit as directed by Owner.

3.9 STORAGE OF SOIL MATERIALS

A. Stockpile borrow soil materials and excavated satisfactory soil materials without intermixing. Place, grade, and shape stockpiles to drain surface water. Cover to prevent windblown dust.

1. Stockpile soil materials away from edge of excavations. Do not store within drip line of remaining trees.

3.10 BACKFILL

A. Place and compact backfill in excavations promptly, but not before completing the following:

1. Construction below finish grade including, where applicable, subdrainage, dampproofing, waterproofing, and perimeter insulation.
2. Surveying locations of underground utilities for Record Documents.
3. Testing and inspecting underground utilities.
4. Removing concrete formwork.
5. Removing trash and debris.
6. Removing temporary shoring and bracing, and sheeting.

7. Installing permanent or temporary horizontal bracing on horizontally supported walls.

B. Place backfill on subgrades free of mud, frost, snow, or ice.

3.11 UTILITY TRENCH BACKFILL

A. Place backfill on subgrades free of mud, frost, snow, or ice.

B. Place and compact bedding course on trench bottoms and where indicated. Shape bedding course to provide continuous support for bells, joints, and barrels of pipes and for joints, fittings, and bodies of conduits.

C. Trenches under Footings: Backfill trenches excavated under footings and within 18 inches of bottom of footings with satisfactory soil; fill with concrete to elevation of bottom of footings. Concrete is specified in Division 03 Section "Cast-in-Place Concrete."

D. Trenches under Roadways: Provide 4-inch- thick, concrete-base slab support for piping or conduit less than 30 inches below surface of roadways. After installing and testing, completely encase piping or conduit in a minimum of 4 inches of concrete before backfilling or placing roadway subbase course. Concrete is specified in Division 03 Section "Cast-in-Place Concrete."

E. Backfill voids with satisfactory soil while removing shoring and bracing.

F. Place and compact initial backfill of subbase material, free of particles larger than 1 inch in any dimension, to a height of 12 inches over the pipe or conduit.

1. Carefully compact initial backfill under pipe haunches and compact evenly up on both sides and along the full length of piping or conduit to avoid damage or displacement of piping or conduit. Coordinate backfilling with utilities testing.

G. Place and compact final backfill of satisfactory soil to final subgrade elevation.

H. Install detectable warning tape directly above utilities, 12 inches below finished grade, except 6 inches below subgrade under pavements and slabs.

3.12 SOIL FILL

A. Plow, scarify, bench, or break up sloped surfaces steeper than 1 vertical to 4 horizontal so fill material will bond with existing material.

B. Place and compact fill material in layers to required elevations as follows:

1. Under grass and planted areas, use satisfactory soil material.
2. Under walks and pavements, use satisfactory soil material.
3. Under steps and ramps, use engineered fill.
4. Under building slabs, use engineered fill.
5. Under footings and foundations, use engineered fill.

C. Place soil fill on subgrades free of mud, frost, snow, or ice.

3.13 SOIL MOISTURE CONTROL

A. Uniformly moisten or aerate subgrade and each subsequent fill or backfill soil layer before compaction to within 2 percent of optimum moisture content.

1. Do not place backfill or fill soil material on surfaces that are muddy, frozen, or contain frost or ice.
2. Remove and replace, or scarify and air dry, otherwise satisfactory soil material that exceeds optimum moisture content by 2 percent and is too wet to compact to specified dry unit weight.

3.14 COMPACTION OF SOIL BACKFILLS AND FILLS

A. Place backfill and fill soil materials in layers not more than 8 inches in loose depth for material compacted by heavy compaction equipment, and not more than 4 inches in loose depth for material compacted by hand-operated tampers.

B. Place backfill and fill soil materials evenly on all sides of structures to required elevations, and uniformly along the full length of each structure.

C. Compact soil materials to not less than the following percentages of maximum dry unit weight according to ASTM D 698:

1. Under structures, building slabs, scarify and recompact top 12 inches of existing subgrade and each layer of backfill or fill soil material at 95 percent.
2. Under walkways, scarify and recompact top 6 inches below subgrade and compact each layer of backfill or fill soil material at 95 percent.
3. Under turf or unpaved areas, scarify and recompact top 6 inches below subgrade and compact each layer of backfill or fill soil material at 93 percent.
4. For utility trenches, compact each layer of initial and final backfill soil material at 85 percent.

3.15 GRADING

A. General: Uniformly grade areas to a smooth surface, free of irregular surface changes. Comply with compaction requirements and grade to cross sections, lines, and elevations indicated.

1. Provide a smooth transition between adjacent existing grades and new grades.
2. Cut out soft spots, fill low spots, and trim high spots to comply with required surface tolerances.

B. Site Rough Grading: Slope grades to direct water away from buildings and to prevent ponding. Finish subgrades to required elevations within the following tolerances:

1. Turf or Unpaved Areas: Plus or minus 1 inch.
2. Walks: Plus or minus 1 inch.
3. Pavements: Plus or minus 1/2 inch.

3.16 SUBBASE AND BASE COURSES UNDER PAVEMENTS AND WALKS

A. Place course on subgrades free of mud, frost, snow, or ice.

B. On prepared subgrade, place course under pavements and walks as follows:
   1. Place base course material over subbase course under hot-mix asphalt pavement.
   2. Shape subbase course and base course to required crown elevations and cross-slope grades.
   3. Place subbase course and base course 6 inches or less in compacted thickness in a single layer.
   4. Place subbase course and base course that exceeds 6 inches in compacted thickness in layers of equal thickness, with no compacted layer more than 6 inches thick or less than 3 inches thick.
   5. Compact subbase course and base course at optimum moisture content to required grades, lines, cross sections, and thickness to not less than 95 percent of maximum dry unit weight according to ASTM D 698.

3.17 DRAINAGE COURSE UNDER CONCRETE SLABS-ON-GRADE

A. Place drainage course on subgrades free of mud, frost, snow, or ice.

B. On prepared subgrade, place and compact drainage course under cast-in-place concrete slabs-on-grade as follows:
   1. Place drainage course 6 inches or less in compacted thickness in a single layer.
   2. Place drainage course that exceeds 6 inches in compacted thickness in layers of equal thickness, with no compacted layer more than 6 inches thick or less than 3 inches thick.
   3. Compact each layer of drainage course to required cross sections and thicknesses to not less than 95 percent of maximum dry unit weight according to ASTM D 698.

3.18 PROTECTION

A. Protecting Graded Areas: Protect newly graded areas from traffic, freezing, and erosion. Keep free of trash and debris.

B. Repair and reestablish grades to specified tolerances where completed or partially completed surfaces become eroded, rutted, settled, or where they lose compaction due to subsequent construction operations or weather conditions.

   1. Scarify or remove and replace soil material to depth as directed by Owner; reshape and recompact.

C. Where settling occurs before Project correction period elapses, remove finished surfacing, backfill with additional soil material, compact, and reconstruct surfacing.

   1. Restore appearance, quality, and condition of finished surfacing to match adjacent work, and eliminate evidence of restoration to greatest extent possible.

3.19 DISPOSAL OF SURPLUS AND WASTE MATERIALS

A. Transport surplus satisfactory soil to designated storage areas on Owner's property. Stockpile or spread soil as directed by Owner.

1. Remove waste materials, including unsatisfactory soil, trash, and debris, and legally dispose of them off Owner's property.

END OF SECTION 312000

SECTION 329200 - TURF AND GRASSES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including Instructions to Bidders, Introduction, General Conditions, and Scope of Work Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Seeding.
2. Hydroseeding.
3. Sodding.
4. Plugging.
5. Sprigging.
6. Grass paving
7. Topsoil amendments and importing topsoil for planting lawns.

B. Related Sections:

1. Division 31 Section "Earth Moving" for excavation, filling and backfilling, and rough grading.

1.3 DEFINITIONS

A. Duff Layer: The surface layer of native topsoil that is composed of mostly decayed leaves, twigs, and detritus.

B. Finish Grade: Elevation of finished surface of planting soil.

C. Manufactured Topsoil: Soil produced off-site by homogeneously blending mineral soils or sand with stabilized organic soil amendments to produce topsoil or planting soil.

D. Pesticide: A substance or mixture intended for preventing, destroying, repelling, or mitigating a pest. This includes insecticides, miticides, herbicides, fungicides, rodenticides, and molluscicides. It also includes substances or mixtures intended for use as a plant regulator, defoliant, or desiccant.

E. Pests: Living organisms that occur where they are not desired or that cause damage to plants, animals, or people. These include insects, mites, grubs, mollusks (snails and slugs), rodents (gophers, moles, and mice), unwanted plants (weeds), fungi, bacteria, and viruses.

F. Planting Soil: Standardized topsoil; existing, native surface topsoil; existing, in-place surface soil; imported topsoil; or manufactured topsoil that is modified with soil amendments and perhaps fertilizers to produce a soil mixture best for plant growth.

G. Subgrade: Surface or elevation of subsoil remaining after excavation is complete, or top surface of a fill or backfill before planting soil is placed.

H. Subsoil: All soil beneath the topsoil layer of the soil profile, and typified by the lack of organic matter and soil organisms.

I. Surface Soil: Soil that is present at the top layer of the existing soil profile at the Project site. In undisturbed areas, the surface soil is typically topsoil, but in disturbed areas such as urban environments, the surface soil can be subsoil.

1.4 QUALITY ASSURANCE

A. Installer Qualifications: A qualified landscape Installer whose work has resulted in successful turf establishment.

1. Professional Membership: Installer shall be a member in good standing of either the Professional Landcare Network or the American Nursery and Landscape Association.
2. Experience: Five years' experience in turf installation.
3. Installer's Field Supervision: Require Installer to maintain an experienced full-time supervisor on Project site when work is in progress.
4. Personnel Certifications: Installer's field supervisor shall have certification in one of the following categories from the Professional Landcare Network:

    a. Certified Landscape Technician - Exterior, with installation, maintenance, and irrigation specialty area(s), designated CLT-Exterior.
    b. Certified Turfgrass Professional, designated CTP.
    c. Certified Turfgrass Professional of Cool Season Lawns, designated CTP-CSL.

5. Maintenance Proximity: Not more than one hours' normal travel time from Installer's place of business to Project site.
6. Pesticide Applicator: State licensed, commercial.

B. Soil-Testing Laboratory Qualifications: An independent laboratory or university laboratory, recognized by the State Department of Agriculture, with the experience and capability to conduct the testing indicated and that specializes in types of tests to be performed.

C. Soil Analysis: For each unamended soil type, furnish soil analysis and a written report by a qualified soil-testing laboratory stating percentages of organic matter; gradation of sand, silt, and clay content; cation exchange capacity; [**sodium absorption ratio;**]deleterious material; pH; and mineral and plant-nutrient content of the soil.

1. Testing methods and written recommendations shall comply with USDA's Handbook No. 60.
2. The soil-testing laboratory shall oversee soil sampling, with depth, location, and number of samples to be taken per instructions from Architect. A minimum of three

representative samples shall be taken from varied locations for each soil to be used or amended for planting purposes.

3. Report suitability of tested soil for turf growth.

    a. Based on the test results, state recommendations for soil treatments and soil amendments to be incorporated. State recommendations in weight per 1000 sq. ft. or volume per cu. yd for nitrogen, phosphorus, and potash nutrients and soil amendments to be added to produce satisfactory planting soil suitable for healthy, viable plants.
    b. Report presence of problem salts, minerals, or heavy metals, including aluminum, arsenic, barium, cadmium, chromium, cobalt, lead, lithium, and vanadium. If such problem materials are present, provide additional recommendations for corrective action.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Seed and Other Packaged Materials: Deliver packaged materials in original, unopened containers showing weight, certified analysis, name and address of manufacturer, and indication of conformance with state and federal laws, as applicable.

B. Bulk Materials:

1. Do not dump or store bulk materials near structures, utilities, walkways and pavements, or on existing turf areas or plants.
2. Provide erosion-control measures to prevent erosion or displacement of bulk materials, discharge of soil-bearing water runoff, and airborne dust reaching adjacent properties, water conveyance systems, or walkways.
3. Accompany each delivery of bulk fertilizers, lime, and soil amendments with appropriate certificates.

1.6 PROJECT CONDITIONS

A. Planting Restrictions: Plant during one of the following periods. Coordinate planting periods with initial maintenance periods to provide required maintenance from date of Substantial Completion.

1. Spring Planting: March 15 through June 1.
2. Fall Planting: August 15 through October 15.

B. Weather Limitations: Proceed with planting only when existing and forecasted weather conditions permit planting to be performed when beneficial and optimum results may be obtained. Apply products during favorable weather conditions according to manufacturer's written instructions.

1.7 MAINTENANCE SERVICE

A. Initial Turf Maintenance Service: Provide full maintenance by skilled employees of landscape Installer. Maintain as required in Part 3. Begin maintenance immediately after each area is

planted and continue until acceptable turf is established but for not less than the following periods:

1. Seeded Turf: 90 days from date of Substantial Completion.

    a. When initial maintenance period has not elapsed before end of planting season, or if turf is not fully established, continue maintenance during next planting season.

2. Sodded Turf: 90 days from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 SEED

A. Grass Seed: Fresh, clean, dry, new-crop seed complying with AOSA's "Journal of Seed Technology; Rules for Testing Seeds" for purity and germination tolerances.

B. Seed Species: State-certified seed of grass species as follows:

C. Seed Species: Seed of grass species as follows, with not less than 90 percent germination, not less than 98 percent pure seed, and not more than 0.5 percent weed seed:

1. New Sun and Partial Shade: Proportioned by weight as follows:

    a. 20 percent Kentucky bluegrass mixture.
    b. 10 percent Pennlawn red fescue.
    c. 70 percent perennial ryegrass mixture.

D. Overseed Species: Seed of grass species as follows, with not less than 90 percent germination, not less than 98 percent pure seed, and not more than 0.5 percent weed seed, proportioned by weight as follows:

    a. 60 percent Kentucky bluegrass mixture.
    b. 40 percent Pennlawn red fescue.

2.2 TURFGRASS SOD

A. Turfgrass Sod: Certified complying with "Specifications for Turfgrass Sod Materials" in TPI's "Guideline Specifications to Turfgrass Sodding." Furnish viable sod of uniform density, color, and texture, strongly rooted, and capable of vigorous growth and development when planted.

B. Turfgrass Species: Sod of grass species as follows, with not less than 95 percent germination, not less than 85 percent pure seed, and not more than 0.5 percent weed seed:

1. Sun and Partial Shade: Proportioned by weight as follows:

    a. 50 percent Kentucky bluegrass (Poa pratensis).
    b. 30 percent chewings red fescue (Festuca rubra variety).
    c. 10 percent perennial ryegrass (Lolium perenne).

d. 10 percent redtop (Agrostis alba).

2.3 INORGANIC SOIL AMENDMENTS

A. Lime: ASTM C 602, agricultural liming material containing a minimum of 80 percent calcium carbonate equivalent and as follows:

1. Class: O, with a minimum of 95 percent passing through No. 8 sieve and a minimum of 55 percent passing through No. 60 sieve.
2. Provide lime in form of ground dolomitic limestone.

B. Sulfur: Granular, biodegradable, containing a minimum of 90 percent sulfur, and with a minimum of 99 percent passing through No. 6 sieve and a maximum of 10 percent passing through No. 40 sieve.

C. Iron Sulfate: Granulated ferrous sulfate containing a minimum of 20 percent iron and 10 percent sulfur.

D. Aluminum Sulfate: Commercial grade, unadulterated.

E. Perlite: Horticultural perlite, soil amendment grade.

F. Agricultural Gypsum: Minimum 90 percent calcium sulfate, finely ground with 90 percent passing through No. 50 sieve.

G. Sand: Clean, washed, natural or manufactured, and free of toxic materials.

H. Diatomaceous Earth: Calcined, 90 percent silica, with approximately 140 percent water absorption capacity by weight.

I. Zeolites: Mineral clinoptilolite with at least 60 percent water absorption by weight.

2.4 ORGANIC SOIL AMENDMENTS

A. Compost: Well-composted, stable, and weed-free organic matter, pH range of 5.5 to 8; moisture content 35 to 55 percent by weight; 100 percent passing through 1/2-inch sieve; soluble salt content of 5 to 10 decisiemens/m; not exceeding 0.5 percent inert contaminants and free of substances toxic to plantings; and as follows:

1. Organic Matter Content: 50 to 60 percent of dry weight.
2. Feedstock: Agricultural, food, or industrial residuals; biosolids; yard trimmings; or source-separated or compostable mixed solid waste.

B. Sphagnum Peat: Partially decomposed sphagnum peat moss, finely divided or of granular texture, with a pH range of 3.4 to 4.8.

C. Muck Peat: Partially decomposed moss peat, native peat, or reed-sedge peat, finely divided or of granular texture, with a pH range of 6 to 7.5, and having a water-absorbing capacity of 1100 to 2000 percent.

D. Manure: Well-rotted, unleached, stable or cattle manure containing not more than 25 percent by volume of straw, sawdust, or other bedding materials; free of toxic substances, stones, sticks, soil, weed seed, and material harmful to plant growth.

2.5 FERTILIZERS

A. Superphosphate: Commercial, phosphate mixture, soluble; a minimum of 20 percent available phosphoric acid.

B. Commercial Fertilizer: Commercial-grade complete fertilizer of neutral character, consisting of fast- and slow-release nitrogen, 50 percent derived from natural organic sources of urea formaldehyde, phosphorous, and potassium in the following composition:

1. Composition: Nitrogen, phosphorous, and potassium in amounts recommended in soil reports from a qualified soil-testing laboratory.

C. Slow-Release Fertilizer: Granular or pelleted fertilizer consisting of 50 percent water-insoluble nitrogen, phosphorus, and potassium in the following composition:

1. Composition: 20 percent nitrogen, 10 percent phosphorous, and 10 percent potassium, by weight.

2.6 PLANTING SOILS

A. Planting Soil: Existing, native surface topsoil formed under natural conditions with the duff layer retained during excavation process and stockpiled on-site. Verify suitability of native surface topsoil to produce viable planting soil. Clean soil of roots, plants, sod, stones, clay lumps, and other extraneous materials harmful to plant growth.

1. Supplement with imported or manufactured topsoil from off-site sources to provide quantities required for lawn planting.
2. Mix existing, native surface topsoil with the following soil amendments and fertilizers in the following quantities to produce planting soil:

a. Ratio of Loose Compost to Topsoil by Volume: 1:4.
b. Ratio of Loose Sphagnum Peat to Topsoil by Volume: 1:4.

2.7 MULCHES

A. Straw Mulch: Provide air-dry, clean, mildew- and seed-free, salt hay or threshed straw of wheat, rye, oats, or barley.

B. Sphagnum Peat Mulch: Partially decomposed sphagnum peat moss, finely divided or of granular texture, and with a pH range of 3.4 to 4.8.

C. Muck Peat Mulch: Partially decomposed moss peat, native peat, or reed-sedge peat, finely divided or of granular texture, with a pH range of 6 to 7.5, and having a water-absorbing capacity of 1100 to 2000 percent.

D. Compost Mulch: Well-composted, stable, and weed-free organic matter, pH range of 5.5 to 8; moisture content 35 to 55 percent by weight; 100 percent passing through 1-inch sieve; soluble salt content of 2 to 5 decisiemens/m; not exceeding 0.5 percent inert contaminants and free of substances toxic to plantings; and as follows:

1. Organic Matter Content: 50 to 60 percent of dry weight.

E. Fiber Mulch: Biodegradable, dyed-wood, cellulose-fiber mulch; nontoxic and free of plant-growth or germination inhibitors; with a maximum moisture content of 15 percent and a pH range of 4.5 to 6.5.

F. Nonasphaltic Tackifier: Colloidal tackifier recommended by fiber-mulch manufacturer for slurry application; nontoxic and free of plant-growth or germination inhibitors.

G. Asphalt Emulsion: ASTM D 977, Grade SS-1; nontoxic and free of plant-growth or germination inhibitors.

2.8 PESTICIDES

A. General: Pesticide, registered and approved by EPA, acceptable to authorities having jurisdiction, and of type recommended by manufacturer for each specific problem and as required for Project conditions and application. Do not use restricted pesticides unless authorized in writing by authorities having jurisdiction.

B. Pre-Emergent Herbicide (Selective and Non-Selective): Effective for controlling the germination or growth of weeds within planted areas at the soil level directly below the mulch layer.

C. Post-Emergent Herbicide (Selective and Non-Selective): Effective for controlling weed growth that has already germinated.

2.9 EROSION-CONTROL MATERIALS

A. Erosion-Control Fiber Mesh: Biodegradable burlap or spun-coir mesh, a minimum of 0.92 lb/sq. yd., with 50 to 65 percent open area. Include manufacturer's recommended steel wire staples, 6 inches long.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas to be planted for compliance with requirements and other conditions affecting performance.

1. Verify that no foreign or deleterious material or liquid such as paint, paint washout, concrete slurry, concrete layers or chunks, cement, plaster, oils, gasoline, diesel fuel, paint thinner, turpentine, tar, roofing compound, or acid has been deposited in soil within a planting area.

2. Do not mix or place soils and soil amendments in frozen, wet, or muddy conditions.
3. Suspend soil spreading, grading, and tilling operations during periods of excessive soil moisture until the moisture content reaches acceptable levels to attain the required results.
4. Uniformly moisten excessively dry soil that is not workable and which is too dusty.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

C. If contamination by foreign or deleterious material or liquid is present in soil within a planting area, remove the soil and contamination as directed by Owner and replace with new planting soil.

3.2 PREPARATION

A. Protect structures, utilities, sidewalks, pavements, and other facilities, trees, shrubs, and plantings from damage caused by planting operations.

1. Protect adjacent and adjoining areas from hydroseeding and hydromulching overspray.
2. Protect grade stakes set by others until directed to remove them.

B. Install erosion-control measures to prevent erosion or displacement of soils and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways.

3.3 TURF AREA PREPARATION

A. Limit turf subgrade preparation to areas to be planted.

B. Newly Graded Subgrades: Loosen subgrade to a minimum depth of 6 inches. Remove stones larger than 1 inch in any dimension and sticks, roots, rubbish, and other extraneous matter and legally dispose of them off Owner's property.

1. Apply superphosphate fertilizer directly to subgrade before loosening.
2. Thoroughly blend planting soil off-site before spreading.

    a. Delay mixing fertilizer with planting soil if planting will not proceed within a few days.
    b. Mix lime with dry soil before mixing fertilizer.

3. Spread planting soil to a depth of 6 inches but not less than required to meet finish grades after light rolling and natural settlement. Do not spread if planting soil or subgrade is frozen, muddy, or excessively wet.

    a. Spread approximately 1/2 the thickness of planting soil over loosened subgrade. Mix thoroughly into top 2 inches of subgrade. Spread remainder of planting soil.
    b. Reduce elevation of planting soil to allow for soil thickness of sod.

C. Unchanged Subgrades: If turf is to be planted in areas unaltered or undisturbed by excavating, grading, or surface-soil stripping operations, prepare surface soil as follows:

1. Remove existing grass, vegetation, and turf. Do not mix into surface soil.

2. Loosen surface soil to a depth of at least 6 inches. Apply soil amendments and fertilizers according to planting soil mix proportions and mix thoroughly into top 4 inches of soil. Till soil to a homogeneous mixture of fine texture.

    a. Apply superphosphate fertilizer directly to surface soil before loosening.

3. Remove stones larger than 1-1/2 inches in any dimension and sticks, roots, trash, and other extraneous matter.
4. Legally dispose of waste material, including grass, vegetation, and turf, off Owner's property.

D. Finish Grading: Grade planting areas to a smooth, uniform surface plane with loose, uniformly fine texture. Grade to within plus or minus 1/2 inch of finish elevation. Roll and rake, remove ridges, and fill depressions to meet finish grades. Limit finish grading to areas that can be planted in the immediate future.

E. Moisten prepared area before planting if soil is dry. Water thoroughly and allow surface to dry before planting. Do not create muddy soil.

F. Before planting, obtain Owner's acceptance of finish grading; restore planting areas if eroded or otherwise disturbed after finish grading.

3.4 PREPARATION FOR EROSION-CONTROL MATERIALS

A. For erosion-control mesh, install from top of slope, working downward, and as recommended by material manufacturer for site conditions. Fasten as recommended by material manufacturer.

B. Moisten prepared area before planting if surface is dry. Water thoroughly and allow surface to dry before planting. Do not create muddy soil.

3.5 SEEDING

A. Sow seed with spreader or seeding machine. Do not broadcast or drop seed when wind velocity exceeds 5 mph. Evenly distribute seed by sowing equal quantities in two directions at right angles to each other.

1. Do not use wet seed or seed that is moldy or otherwise damaged.
2. Do not seed against existing trees. Limit extent of seed to outside edge of planting saucer.

B. Sow seed at a total rate of 3 to 4 lb/1000 sq. ft.

C. Rake seed lightly into top 1/8 inch of soil, roll lightly, and water with fine spray.

D. Protect seeded areas with slopes exceeding 1:6 with erosion-control fiber mesh installed and stapled according to manufacturer's written instructions.

E. Protect seeded areas with slopes not exceeding 1:6 by spreading straw mulch. Spread uniformly at a minimum rate of 2 tons/acre to form a continuous blanket 1-1/2 inches in loose thickness over seeded areas. Spread by hand, blower, or other suitable equipment.

3.6 HYDROSEEDING

A. Hydroseeding: Mix specified seed, fertilizer, and fiber mulch in water, using equipment specifically designed for hydroseed application. Continue mixing until uniformly blended into homogeneous slurry suitable for hydraulic application.

1. Mix slurry with nonasphaltic tackifier.
2. Apply slurry uniformly to all areas to be seeded in a one-step process. Apply slurry at a rate so that mulch component is deposited at not less than 1500-lb/acre dry weight, and seed component is deposited at not less than the specified seed-sowing rate.

3.7 SODDING

A. Lay sod within 24 hours of harvesting. Do not lay sod if dormant or if ground is frozen or muddy.

B. Lay sod to form a solid mass with tightly fitted joints. Butt ends and sides of sod; do not stretch or overlap. Stagger sod strips or pads to offset joints in adjacent courses. Avoid damage to subgrade or sod during installation. Tamp and roll lightly to ensure contact with subgrade, eliminate air pockets, and form a smooth surface. Work sifted soil or fine sand into minor cracks between pieces of sod; remove excess to avoid smothering sod and adjacent grass.

1. Lay sod across angle of slopes exceeding 1:3.
2. Anchor sod on slopes exceeding 1:6 with wood pegs or steel staples spaced as recommended by sod manufacturer but not less than 2 anchors per sod strip to prevent slippage.

C. Saturate sod with fine water spray within two hours of planting. During first week after planting, water daily or more frequently as necessary to maintain moist soil to a minimum depth of 1-1/2 inches below sod.

3.8 TURF RENOVATION

A. Renovate existing turf damaged by Contractor's operations, such as storage of materials or equipment and movement of vehicles.

1. Reestablish turf where settlement or washouts occur or where minor regrading is required.
2. Install new planting soil as required.

B. Remove sod and vegetation from diseased or unsatisfactory turf areas; do not bury in soil.

C. Remove topsoil containing foreign materials such as oil drippings, fuel spills, stones, gravel, and other construction materials resulting from Contractor's operations, and replace with new planting soil.

D. Mow, dethatch, core aerate, and rake existing turf.

E. Remove weeds before seeding. Where weeds are extensive, apply selective herbicides as required. Do not use pre-emergence herbicides.

F. Remove waste and foreign materials, including weeds, soil cores, grass, vegetation, and turf, and legally dispose of them off Owner's property.

G. Till stripped, bare, and compacted areas thoroughly to a soil depth of 6 inches.

H. Apply soil amendments and initial fertilizers required for establishing new turf and mix thoroughly into top 4 inches of existing soil. Install new planting soil to fill low spots and meet finish grades.

I. Apply seed and protect with straw mulch as required for new turf.

J. Water newly planted areas and keep moist until new turf is established.

3.9 TURF MAINTENANCE

A. Maintain and establish turf by watering, fertilizing, weeding, mowing, trimming, replanting, and performing other operations as required to establish healthy, viable turf. Roll, regrade, and replant bare or eroded areas and remulch to produce a uniformly smooth turf. Provide materials and installation the same as those used in the original installation.

1. Fill in as necessary soil subsidence that may occur because of settling or other processes. Replace materials and turf damaged or lost in areas of subsidence.
2. In areas where mulch has been disturbed by wind or maintenance operations, add new mulch and anchor as required to prevent displacement.
3. Apply treatments as required to keep turf and soil free of pests and pathogens or disease. Use integrated pest management practices whenever possible to minimize the use of pesticides and reduce hazards.

B. Watering: Install and maintain temporary piping, hoses, and turf-watering equipment to convey water from sources and to keep turf uniformly moist to a depth of 4 inches.

1. Schedule watering to prevent wilting, puddling, erosion, and displacement of seed or mulch. Lay out temporary watering system to avoid walking over muddy or newly planted areas.
2. Water turf with fine spray at a minimum rate of 1 inch per week unless rainfall precipitation is adequate.

C. Mow turf as soon as top growth is tall enough to cut. Repeat mowing to maintain specified height without cutting more than 1/3 of grass height. Remove no more than 1/3 of grass-leaf growth in initial or subsequent mowings. Do not delay mowing until grass blades bend over and become matted. Do not mow when grass is wet. Schedule initial and subsequent mowings to maintain the following grass height:

1. Mow Kentucky bluegrass, annual ryegrass, chewings red fescue to a height of 1-1/2 to 2 inches.

D. Turf Postfertilization: Apply fertilizer after initial mowing and when grass is dry.

1. Use fertilizer that will provide actual nitrogen of at least 1 lb/1000 sq. ft. to turf area.

3.10 SATISFACTORY TURF

A. Turf installations shall meet the following criteria as determined by Owner:

1. Satisfactory Seeded Turf: At end of maintenance period, a healthy, uniform, close stand of grass has been established, free of weeds and surface irregularities, with coverage exceeding 90 percent over any 10 sq. ft. and bare spots not exceeding 5 by 5 inches.
2. Satisfactory Sodded Turf: At end of maintenance period, a healthy, well-rooted, even-colored, viable turf has been established, free of weeds, open joints, bare areas, and surface irregularities.

B. Use specified materials to reestablish turf that does not comply with requirements and continue maintenance until turf is satisfactory.

3.11 PESTICIDE APPLICATION

A. Apply pesticides and other chemical products and biological control agents in accordance with requirements of authorities having jurisdiction and manufacturer's written recommendations. Coordinate applications with Owner's operations and others in proximity to the Work. Notify Owner before each application is performed.

B. Post-Emergent Herbicides (Selective and Non-Selective): Apply only as necessary to treat already-germinated weeds and in accordance with manufacturer's written recommendations.

3.12 CLEANUP AND PROTECTION

A. Promptly remove soil and debris created by turf work from paved areas. Clean wheels of vehicles before leaving site to avoid tracking soil onto roads, walks, or other paved areas.

B. Erect temporary fencing or barricades and warning signs as required to protect newly planted areas from traffic. Maintain fencing and barricades throughout initial maintenance period and remove after plantings are established.

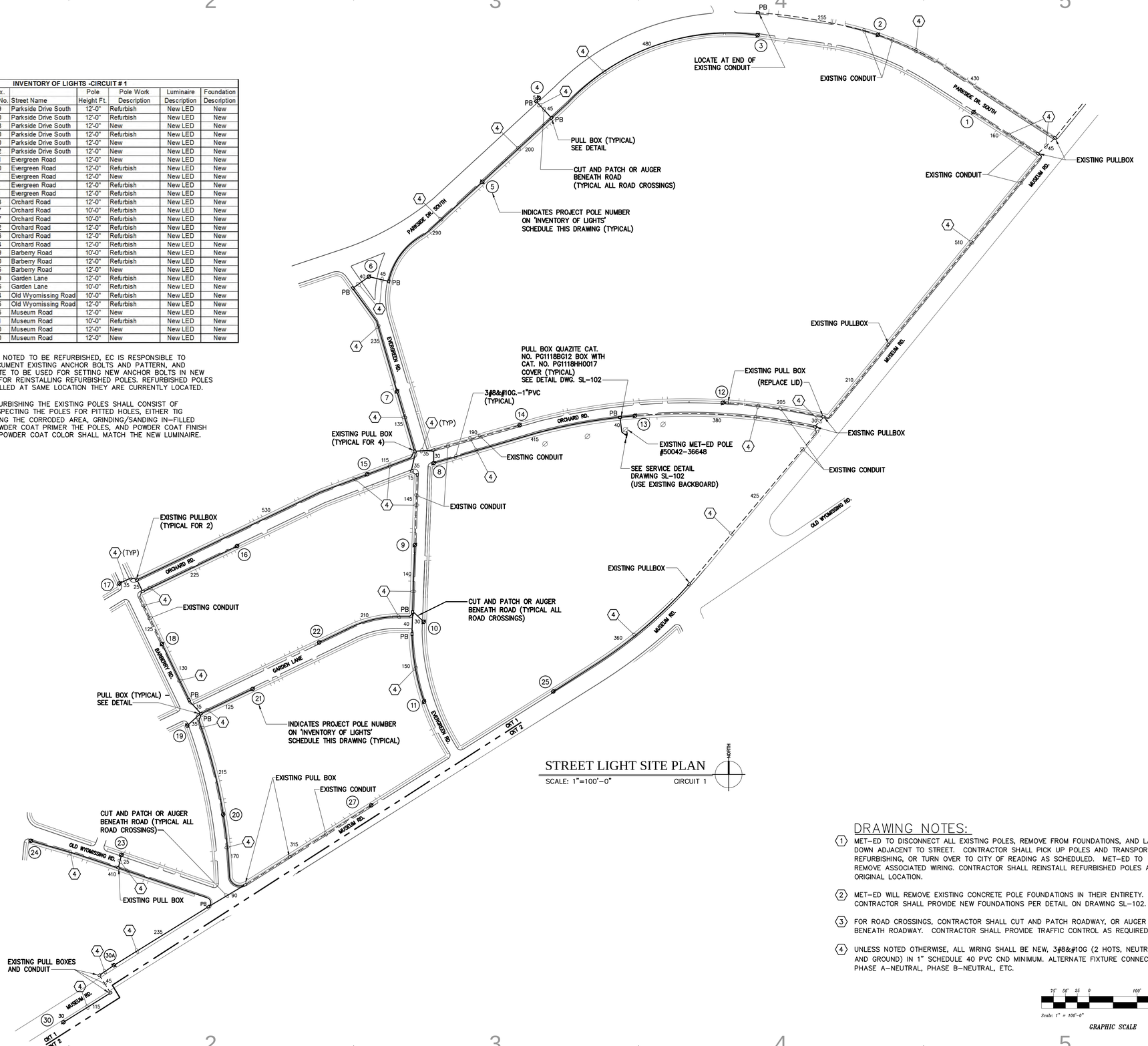
C. Remove nondegradable erosion-control measures after grass establishment period.

END OF SECTION 329200

INVENTORY OF LIGHTS -CIRCUIT # 1							
Project Number	Met Ed Pole No.	Approx. Street No.	Street Name	Pole Height Ft.	Pole Work Description	Luminaire Description	Foundation Description
1	50139-36699	1209	Parkside Drive South	12'-0"	Refurbish	New LED	New
2	50118-36721	1220	Parkside Drive South	12'-0"	Refurbish	New LED	New
3	50070-36717	1228	Parkside Drive South	12'-0"	New	New LED	New
4	50039-36713	1230	Parkside Drive South	12'-0"	Refurbish	New LED	New
5	50028-36694	1230	Parkside Drive South	12'-0"	New	New LED	New
6	50004-36652	1232	Parkside Drive South	12'-0"	New	New LED	New
7	50008-36659	1101	Evergreen Road	12'-0"	New	New LED	New
8	50019-36640	1050	Evergreen Road	12'-0"	Refurbish	New LED	New
9	50011-36619	999	Evergreen Road	12'-0"	New	New LED	New
10	50018-36598	900	Evergreen Road	12'-0"	Refurbish	New LED	New
11	50019-36585	859	Evergreen Road	12'-0"	Refurbish	New LED	New
12	50114-36655	1203	Orchard Road	12'-0"	Refurbish	New LED	New
13	50102-36648	1207	Orchard Road	10'-0"	Refurbish	New LED	New
14	50063-36659	1217	Orchard Road	10'-0"	Refurbish	New LED	New
15	49995-36641	1302	Orchard Road	12'-0"	Refurbish	New LED	New
16	49965-36617	1306	Orchard Road	12'-0"	Refurbish	New LED	New
17	49934-36611	1394	Orchard Road	12'-0"	Refurbish	New LED	New
18	49951-36601	1069	Barberry Road	10'-0"	Refurbish	New LED	New
19	49955-36577	1030	Barberry Road	12'-0"	Refurbish	New LED	New
20	49971-36557	1005	Barberry Road	12'-0"	New	New LED	New
21	49978-36585	1309	Garden Lane	12'-0"	Refurbish	New LED	New
22	49989-36595	1305	Garden Lane	10'-0"	Refurbish	New LED	New
23	49941-36533	1404	Old Wyomissing Road	10'-0"	Refurbish	New LED	New
24	49916-36530	1285	Old Wyomissing Road	12'-0"	Refurbish	New LED	New
25	50041-36578	1285	Museum Road	12'-0"	New	New LED	New
27	50000-36552	1321	Museum Road	10'-0"	Refurbish	New LED	New
30	49935-36496	1430	Museum Road	12'-0"	New	New LED	New
30A	49951-36517	1440	Museum Road	12'-0"	New	New LED	New

WHERE POLES ARE NOTED TO BE REFURBISHED, EC IS RESPONSIBLE TO MEASURE AND DOCUMENT EXISTING ANCHOR BOLTS AND PATTERN, AND CREATE A TEMPLATE TO BE USED FOR SETTING NEW ANCHOR BOLTS IN NEW CONCRETE BASES FOR REINSTALLING REFURBISHED POLES. REFURBISHED POLES SHALL BE REINSTALLED AT SAME LOCATION THEY ARE CURRENTLY LOCATED.

THE WORK OF REFURBISHING THE EXISTING POLES SHALL CONSIST OF SANDBLASTING, INSPECTING THE POLES FOR PITTED HOLES, EITHER TIG WELDING OR BRAZING THE CORRODED AREA, GRINDING/SANDING IN-FILLED AREA SMOOTH, POWDER COAT PRIMER THE POLES, AND POWDER COAT FINISH THE POLES. THE POWDER COAT COLOR SHALL MATCH THE NEW LUMINAIRE.



STREET LIGHT SITE PLAN

SCALE: 1"=100'-0" CIRCUIT 1

NORTH

DRAWING NOTES:

1. MET-ED TO DISCONNECT ALL EXISTING POLES, REMOVE FROM FOUNDATIONS, AND LAY DOWN ADJACENT TO STREET. CONTRACTOR SHALL PICK UP POLES AND TRANSPORT FOR REFURBISHING, OR TURN OVER TO CITY OF READING AS SCHEDULED. MET-ED TO REMOVE ASSOCIATED WIRING. CONTRACTOR SHALL REINSTALL REFURBISHED POLES AT ORIGINAL LOCATION.
2. MET-ED WILL REMOVE EXISTING CONCRETE POLE FOUNDATIONS IN THEIR ENTIRETY. CONTRACTOR SHALL PROVIDE NEW FOUNDATIONS PER DETAIL ON DRAWING SL-102.
3. FOR ROAD CROSSINGS, CONTRACTOR SHALL CUT AND PATCH ROADWAY, OR AUGER BENEATH ROADWAY. CONTRACTOR SHALL PROVIDE TRAFFIC CONTROL AS REQUIRED.
4. UNLESS NOTED OTHERWISE, ALL WIRING SHALL BE NEW, 3#8&#10G (2 HOTS, NEUTRAL, AND GROUND) IN 1" SCHEDULE 40 PVC CND MINIMUM. ALTERNATE FIXTURE CONNECTIONS PHASE A-NEUTRAL, PHASE B-NEUTRAL, ETC.

75' 50' 25' 0 100' 200'

Scale: 1" = 100'-0"

GRAPHIC SCALE

ENGINEER:

ECON OPPORTUNITIES, INC.

230 N 5TH ST
READING, PA 19601-3309
610-898-0252

CONSULTANTS

MARK	DATE	DESCRIPTION

PROJECT NO:	
MODEL FILE:	
DRAWN BY:	TK
CHK'D BY:	SG
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CITY OF READING STREET LIGHTS WYOMISSING PARK

SHEET TITLE

STREETLIGHTS PLAN

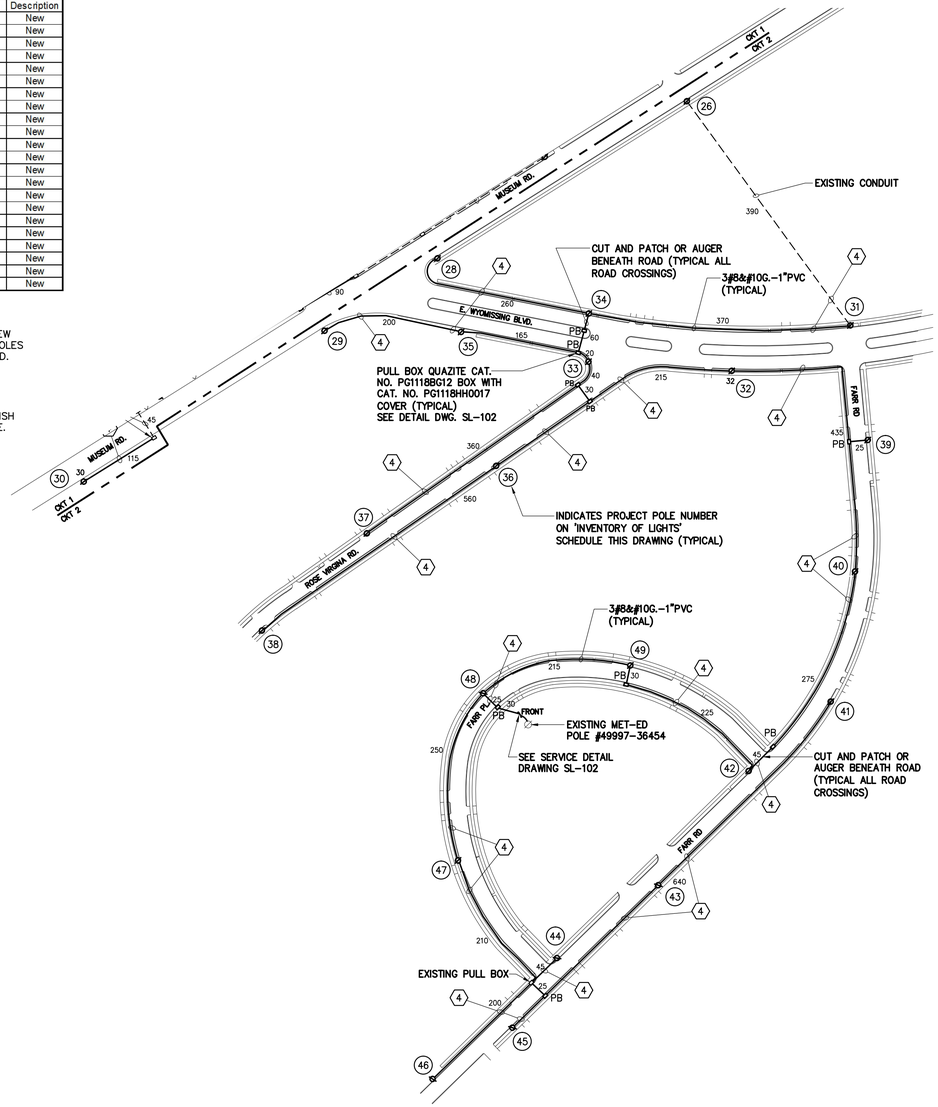
8-1-2014

SL-100

INVENTORY OF LIGHTS -CIRCUIT # 2							
Project Number	Met Ed Pole No.	Approx. Street No.	Street Name	Pole Height Ft.	Pole Work Description	Luminaire Description	Foundation Description
26	50036-36585	1302	Museum Road	10'-0"	Refurbish	New LED	New
28	49988-36537	1347	Museum Road	12'-0"	Refurbish	New LED	New
29	49965-36532	1404	Museum Road	12'-0"	Refurbish	New LED	New
31	50052-36528	1336	East Wyomissing Blvd	12'-0"	New	New LED	New
32	50048-36518	1490	East Wyomissing Blvd	10'-0"	New	New LED	New
33	50014-36515	1515	East Wyomissing Blvd	10'-0"	Refurbish	New LED	New
34	50010-36524	1536	East Wyomissing Blvd	10'-0"	Refurbish	New LED	New
35	49988-36520	1566	East Wyomissing Blvd	10'-0"	Refurbish	New LED	New
36	50004-36500	1409	Rose Virginia Road	12'-0"	Refurbish	New LED	New
37	49966-36484	1450	Rose Virginia Road	10'-0"	Refurbish	New LED	New
38	49957-36465	1484	Rose Virginia Road	10'-0"	Refurbish	New LED	New
39	50062-36509	1303	Farr Road	10'-0"	Refurbish	New LED	New
40	50055-36488	1307	Farr Road	12'-0"	Refurbish	New LED	New
41	50057-36464	1319	Farr Road	12'-0"	Refurbish	New LED	New
42	50039-36453	1420	Farr Road	10'-0"	Refurbish	New LED	New
43	50029-36429	1453	Farr Road	12'-0"	Refurbish	New LED	New
44	50009-36419	1462	Farr Road	10'-0"	Refurbish	New LED	New
45	50008-36403	1486	Farr Road	12'-0"	Refurbish	New LED	New
46	49957-36465	1514	Farr Road	12'-0"	Refurbish	New LED	New
47	49992-36433	807	Farr Place	12'-0"	Refurbish	New LED	New
48	49994-36461	815	Farr Place	12'-0"	Refurbish	New LED	New
49	50022-36477	825	Farr Place	12'-0"	Refurbish	New LED	New

WHERE POLES ARE NOTED TO BE REFURBISHED, EC IS RESPONSIBLE TO MEASURE AND DOCUMENT EXISTING ANCHOR BOLTS AND PATTERN, AND CREATE A TEMPLATE TO BE USED FOR SETTING NEW ANCHOR BOLTS IN NEW CONCRETE BASES FOR REINSTALLING REFURBISHED POLES. REFURBISHED POLES SHALL BE REINSTALLED AT SAME LOCATION THEY ARE CURRENTLY LOCATED.

THE WORK OF REFURBISHING THE EXISTING POLES SHALL CONSIST OF SANDBLASTING, INSPECTING THE POLES FOR PITTED HOLES, EITHER TIG WELDING OR BRAZING THE CORRODED AREA, GRINDING/SANDING IN-FILLED AREA SMOOTH, POWDER COAT PRIMER THE POLES, AND POWDER COAT FINISH THE POLES. THE POWDER COAT COLOR SHALL MATCH THE NEW LUMINAIRE.



STREET LIGHT SITE PLAN

SCALE: 1"=100'-0" CIRCUIT 2

NORTH

DRAWING NOTES:

1. MET-ED TO DISCONNECT ALL EXISTING POLES, REMOVE FROM FOUNDATIONS, AND LAY DOWN ADJACENT TO STREET. CONTRACTOR SHALL PICK UP POLES AND TRANSPORT FOR REFURBISHING, OR TURN OVER TO CITY OF READING AS SCHEDULED. MET-ED TO REMOVE ASSOCIATED WIRING. CONTRACTOR SHALL REINSTALL REFURBISHED POLES AT ORIGINAL LOCATION.
2. MET-ED WILL REMOVE EXISTING CONCRETE POLE FOUNDATIONS IN THEIR ENTIRETY. CONTRACTOR SHALL PROVIDE NEW FOUNDATIONS PER DETAIL ON DRAWING SL-102.
3. FOR ROAD CROSSINGS, CONTRACTOR SHALL CUT AND PATCH ROADWAY, OR AUGER BENEATH ROADWAY. CONTRACTOR SHALL PROVIDE TRAFFIC CONTROL AS REQUIRED.
4. UNLESS NOTED OTHERWISE, ALL WIRING SHALL BE NEW, 3#8&#10G (2 HOTS, NEUTRAL, AND GROUND) IN 1" SCHEDULE 40 PVC CND MINIMUM. ALTERNATE FIXTURE CONNECTIONS PHASE A-NEUTRAL, PHASE B-NEUTRAL, ETC.

75' 50' 25' 0 100' 200'

Scale: 1" = 100'-0"

GRAPHIC SCALE

ENGINEER:

ECON OPPORTUNITIES, INC.

230 N 5TH ST
READING, PA 19601-3309
610-898-0252

CONSULTANTS

CITY OF READING STREET LIGHTS WYOMISSING PARK

MARK	DATE	DESCRIPTION

PROJECT NO:	
MODEL FILE:	
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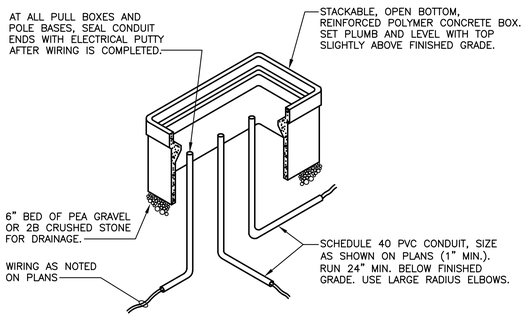
SHEET TITLE

STREETLIGHTS PLAN

8-1-2014

SL-101

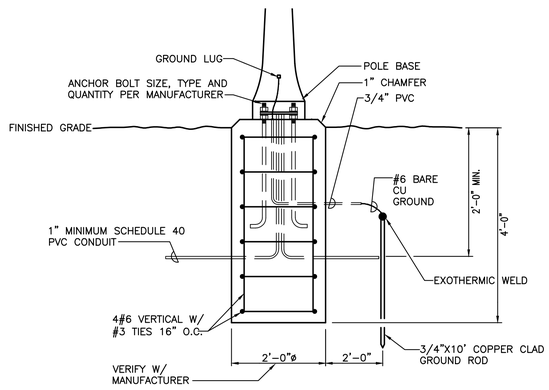


IN GRADE PULLBOX DETAIL

NOT TO SCALE

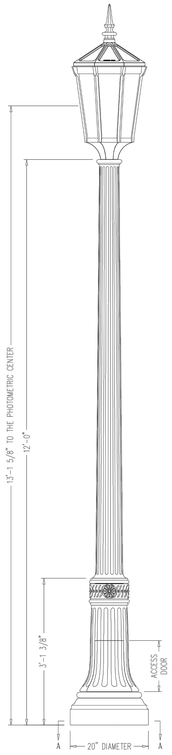
NOTES:

1. CONDUITS NOT TERMINATING IN OR AT PULL BOXES NEED NOT RUN THROUGH PULL BOXES UNLESS REQUIRED TO MAINTAIN NEC PULLING DISTANCES.
2. PROVIDE TIER 22 GASKETED BOX W/ HEAVY DUTY BOLTED, GASKETED COVER LABELED 'ELECTRIC'. QUAZITE 'PG' STYLE OR EQUAL. BOX SIZE AS NOTED ON PLANS. PROVIDE BOX EXTENSIONS AS REQUIRED.



POLE BASE DETAIL

NOT TO SCALE



LIGHTING POLE DETAIL

NOT TO SCALE

DETAIL REPRESENTS BASIS OF DESIGN MANUFACTURER (SPRING CITY). EQUIVALENT MANUFACTURERS SUCH AS ELA BRK18-MOD AND VISCO V1-18 POLES WILL BE CONSIDERED, SUBJECT TO CONFORMANCE WITH DRAWINGS AND SPECIFICATIONS

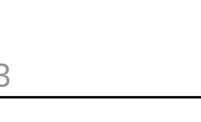
LUMINAIRES SHALL BE CONTROLLED VIA 0-10V DRIVERS, BY A WIRELESS SYSTEM PROVIDED BY LUMINAIRE MANUFACTURER. WIRELESS ANTENNA FOR EACH LUMINAIRE SHALL BE THROUGH SIDE OF LUMINAIRE BASE, OR CONCEALED IN LUMINAIRE. SYSTEM SHALL BE PROGRAMMED SO LUMINAIRES ARE ON AT DUSK WITH A HIGHER LIGHT OUTPUT, THEN SET TO A LOWER LIGHT OUTPUT AT A CITY DETERMINED TIME, THEN BACK TO HIGHER LIGHT OUTPUT PRIOR TO DAWN, THEN OFF AT DAWN.

LUMINAIRE SPECIFICATIONS:

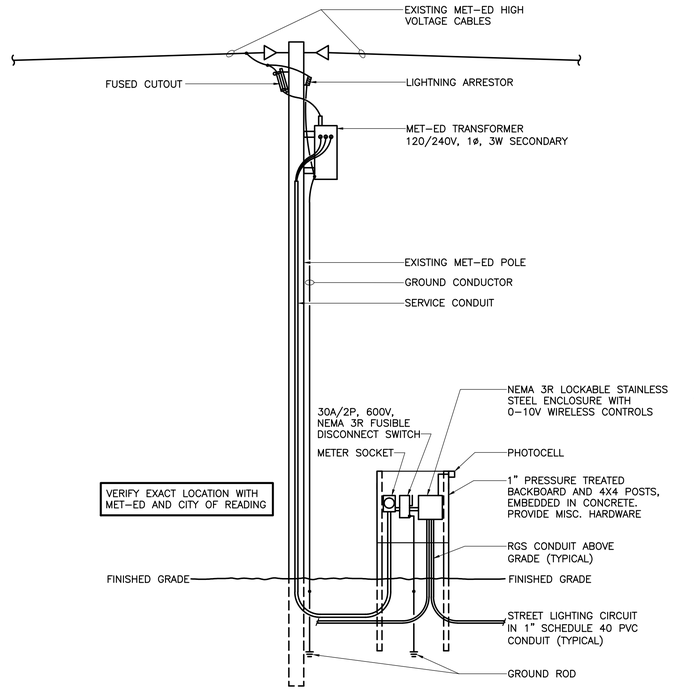
STYLE:	SAVANNAH
HEIGHT:	3'-3 5/8"
WIDTH:	1'-7 1/4" OCTAGONAL
MATERIAL:	CAST ALUMINUM ALLOY ANSI 356 PER A.S.T.M. B26-95
FINISH:	POWDER COAT - HUNTER GREEN
LAMPING:	80 WATT LED
VOLTAGE:	ELECTRONIC WIRED AT 120-277 VOLTS
NUM. OF BOARDS:	2
COLOR TEMP.:	4000K (MEDIUM WHITE)
DISTRIBUTION:	TYPE III (ASYMMETRIC)
OPTICS:	CROSSFIRE REFRACTIVE
PANELS:	PEBBLED ACRYLIC
CATALOG NO.	ALMSWH-LEO80/EVX/X2-40-CR3-YPBP-FSA-CU

LAMP POST SPECIFICATIONS:

STYLE:	NORTHAMPTON
HEIGHT:	12'-0"
PHOTOMETRIC CENTER:	13'-1 5/8"
BASE:	20" DIAMETER
MATERIAL:	CAST DUCTILE IRON PER A536-84 GRADE 65-45-12
FINISH:	POWDER COAT - HUNTER GREEN
ACCESS DOOR:	LOCATED IN BASE SECURED WITH TAMPER PROOF HEX SOCKET SECURITY MACHINE SCREWS
GROUND STUD PROVISIONS:	DRILL AND TAP INSIDE WALL OF BASE OPPOSITE ACCESS DOOR TO ACCOMMODATE A 1/4"-20 GROUND STUD (STUD SUPPLIED BY OTHERS)
ANCHOR BOLTS:	(4) 3/4" DIA. X 24" LONG + 3" HOOK (FULLY GALVANIZED WITH 1 NUT AND 1 WASHER PER BOLT)
BOLT PROJECTION:	3" REQUIRED
TENON:	3 1/2" DIA. X 3" HIGH (TO ACCEPT LUMINAIRE)
CATALOG NO.	DPSNRT-20-12.00-TN3.50/3.00-323/INW-CU



SECTION A-A
N.T.S.



SITE LIGHTING SERVICE DETAIL

NOT TO SCALE

ELECTRICAL GENERAL NOTES

THE FOLLOWING NOTES APPLY TO ALL DRAWINGS:

1. ENTIRE INSTALLATION INCLUDING MATERIALS, EQUIPMENT AND WORKMANSHIP, SHALL CONFORM WITH THE LATEST ADDITION OF THE NATIONAL ELECTRIC CODE, WITH ALL APPLICABLE LAWS, CODES AND REGULATIONS AND REGULATORY BODIES HAVING JURISDICTION OVER THIS WORK.
2. UNLESS OTHERWISE NOTED ALL OUTDOOR ELECTRICAL EQUIPMENT SHALL BE PROVIDED WITH, AND HOUSED IN A NEMA 3R ENCLOSURE.
3. THE CONTRACTOR SHALL VERIFY ALL DIMENSIONS AND CONDITIONS AT THE SITE BEFORE PROCEEDING WITH THE WORK.
4. ALL BRANCH WIRING SHALL BE MINIMUM 2 #8 & 1 #10 GROUND. MINIMUM CONDUIT SIZE SHALL BE 1" SCHEDULE 40 PVC. USE RIGID GALVANIZED STEEL CONDUIT WHERE CONDUIT IS RUN EXPOSED ABOVE GRADE.
5. THE CONTRACTOR SHALL VISIT THE SITE AND BECOME FAMILIAR WITH ALL CONDITIONS AND SYSTEMS THAT EFFECT HIS BIDDING AND WORK, AND SHALL PROVIDE VALUE FOR THE SAME IN HIS BID.
6. THE CONTRACTOR SHALL CONFIRM THE LOCATIONS OF ALL UTILITIES. THE CONTRACTOR IS RESPONSIBLE FOR REPAIRING ANY DAMAGE TO EXISTING UTILITIES. VERIFY WITH PA-1-CALL BEFORE ANY DIGGING. E.C. IS RESPONSIBLE FOR ALL SAW CUTTING, EXCAVATION, BACKFILLING AND RESTORATION, AND AUGERING REQUIRED TO PERFORM HIS WORK.
7. IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO VERIFY FIELD CONDITIONS AT THE SITE AND NOTIFY THE OWNER OF ANY DISCREPANCIES PRIOR TO COMMENCING WITH THE WORK.
8. THE ELECTRICAL CONTRACTOR SHALL PERFORM ALL CUTTING AND PATCHING OF EXISTING CONSTRUCTION REQUIRED BY HIS WORK. ALL FINISHES SHALL MATCH EXISTING, WHETHER CONCRETE, BLACKTOP, OR GRASS. WHERE EQUIPMENT IS REMOVED, CONTRACTOR SHALL PATCH AND REFINISH AREA TO MATCH EXISTING. REPAIRED BLACKTOP AREAS SHALL BE HOT PATCHED AND SEALED. GRASS AREAS SHALL BE DRESSED WITH TOPSOIL AND SEEDED.
9. THE ELECTRICAL CONTRACTOR SHALL EFFECTIVELY PROTECT ALL MATERIALS AND EQUIPMENT FROM ENVIRONMENTAL AND PHYSICAL DAMAGE UNTIL FINAL ACCEPTANCE. CLOSE AND PROTECT ALL OPENINGS DURING CONSTRUCTION. PROVIDE NEW MATERIALS AND EQUIPMENT TO REPLACE ITEMS DAMAGED.
10. EXISTING ELECTRICAL EQUIPMENT THAT INTERFERES WITH THE NEW ARRANGEMENT SHALL BE REMOVED, REINSTALLED, RELOCATED, REROUTED, EXTENDED OR ABANDONED AS REQUIRED, TO SUIT THE NEW ARRANGEMENT.
11. SHOULD REMOVAL, RELOCATION, REROUTING OF ANOTHER TRADE'S WORK BE REQUIRED TO ACCOMMODATE ELECTRICAL WORK, THE ELECTRICAL CONTRACTOR SHALL BE RESPONSIBLE FOR THAT WORK AND SHALL PAY ALL REQUIRED COSTS. WORK SHALL BE PERFORMED BY MECHANICS SKILLED IN THE PARTICULAR TRADE INVOLVED.
12. EXISTING LANDSCAPE AND HARD SURFACES DAMAGED SHALL BE RESTORED TO THEIR ORIGINAL CONDITION OR REPLACED.
13. EXISTING ELECTRICAL WORK THAT IS TO REMAIN WHEN OTHER ELECTRICAL WORK IS TO BE MODIFIED OR REMOVED SHALL BE MAINTAINED ON A PERMANENT BASIS.
14. ELECTRICAL CONTRACTOR SHALL BE RESPONSIBLE FOR MAINTAINING INTEGRITY OF ALL STRUCTURAL ELEMENTS.
15. DIVISION 26 OR EC SHALL USED INTERCHANGEABLY AND SHALL INDICATE WORK INCLUDED UNDER THE ELECTRICAL CONTRACTORS SCOPE.
16. ALL EQUIPMENT REMOVED SHALL BE TURNED OVER TO OWNER NO LONGER REQUIRED. ALL MATERIALS NOT DESIRED BY OWNER SHALL BE REMOVED FROM SITE.
17. CONTRACTOR SHALL COORDINATE ALL DEMOLITION WORK WITH PHASING PLAN, OWNERS REPRESENTATIVE, AND OTHER TRADES.

ENGINEER:
ECON OPPORTUNITIES, INC.
230 N 5TH ST
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CONSULTANTS

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CITY OF READING STREET LIGHTS WYOMISSING PARK

SHEET TITLE

STREETLIGHTS DETAILS

8-1-2014

SL-102

pennsylvania
DEPARTMENT OF LABOR & INDUSTRY
BUREAU OF LABOR LAW COMPLIANCE

PREVAILING WAGES PROJECT RATES

Project Name: Wyomissing Park Street Lights

Awarding Agency: City of Reading
Contract Award Date: 7/24/2014
Serial Number: 14-04630
Project Classification: Highway
Determination Date: 7/28/2014
Assigned Field Office: Scranton
Field Office Phone Number: 570-963-4577
Toll Free Phone Number: 877-214-3962

Berks County

Building	Effective Date	Expiration Date	Hourly Rate	Fringe Benefits	Total
Asbestos & Insulation Workers	6/28/2010		$30.63	$20.13	$50.76
Asbestos & Insulation Workers	6/27/2011		$31.67	$21.09	$52.76
Asbestos & Insulation Workers	7/2/2012		$32.17	$21.59	$53.76
Asbestos & Insulation Workers	7/1/2013		$32.17	$22.59	$54.76
Asbestos & Insulation Workers	6/30/2014		$31.90	$23.86	$55.76
Boilermaker (Commercial, Institutional, and Minor Repair Work)	1/1/2010		$23.59	$15.15	$38.74
Boilermaker (Commercial, Institutional, and Minor Repair Work)	3/1/2011		$24.22	$16.02	$40.24
Boilermaker (Commercial, Institutional, and Minor Repair Work)	5/1/2012		$24.84	$16.90	$41.74
Boilermaker (Commercial, Institutional, and Minor Repair Work)	4/1/2013		$25.53	$17.51	$43.04
Boilermaker (Commercial, Institutional, and Minor Repair Work)	3/1/2014		$25.79	$17.95	$43.74
Boilermakers	1/1/2012		$37.62	$29.85	$67.47
Boilermakers	1/1/2013		$38.69	$31.13	$69.82
Boilermakers	4/1/2013		$38.54	$31.43	$69.97
Boilermakers	1/1/2014		$39.06	$32.81	$71.87
Bricklayers, Stone Masons, Pointers, Caulkers, Cleaners	5/1/2013		$31.54	$14.40	$45.94
Bricklayers, Stone Masons, Pointers, Caulkers, Cleaners	5/1/2014		$32.02	$14.72	$46.74

PREVAILING WAGES PROJECT RATES

Building	Effective Date	Expiration Date	Hourly Rate	Fringe Benefits	Total
Bricklayers, Stone Masons, Pointers, Caulkers, Cleaners	5/1/2015		$32.80	$14.79	$47.59
Bricklayers, Stone Masons, Pointers, Caulkers, Cleaners	5/1/2016		$33.58	$14.91	$48.49
Carpenters, Drywall Hangers, Framers, Instrument Men, Lathers, Soft Floor Layers	6/1/2008		$24.42	$9.67	$34.09
Carpenters, Drywall Hangers, Framers, Instrument Men, Lathers, Soft Floor Layers	6/1/2009		$25.69	$10.27	$35.96
Carpenters, Drywall Hangers, Framers, Instrument Men, Lathers, Soft Floor Layers	6/1/2010		$26.71	$11.02	$37.73
Carpenters, Drywall Hangers, Framers, Instrument Men, Lathers, Soft Floor Layers	6/1/2011		$27.61	$11.77	$39.38
Carpenters, Drywall Hangers, Framers, Instrument Men, Lathers, Soft Floor Layers	6/1/2012		$26.88	$13.25	$40.13
Carpenters, Drywall Hangers, Framers, Instrument Men, Lathers, Soft Floor Layers	6/1/2013		$27.18	$13.80	$40.98
Carpenters, Drywall Hangers, Framers, Instrument Men, Lathers, Soft Floor Layers	6/1/2014		$27.57	$14.37	$41.94
Cement Finishers	5/1/2009		$29.10	$10.75	$39.85
Cement Finishers	5/1/2010		$30.85	$10.75	$41.60
Cement Finishers	5/1/2011		$32.45	$11.15	$43.60
Cement Finishers	5/1/2012		$33.30	$11.15	$44.45
Cement Finishers	5/1/2013		$34.15	$11.15	$45.30
Cement Finishers	5/1/2014		$35.05	$11.15	$46.20
Dockbuilder, Pile Drivers	1/1/2010		$29.95	$12.25	$42.20
Dockbuilder, Pile Drivers	1/1/2011		$30.35	$13.10	$43.45
Dockbuilder, Pile Drivers	1/1/2012		$30.85	$13.70	$44.55
Dockbuilder, Pile Drivers	1/1/2013		$31.45	$14.20	$45.65
Drywall Finisher	5/1/2009		$23.31	$12.57	$35.88
Drywall Finisher	5/1/2010		$23.86	$13.42	$37.28
Drywall Finisher	5/1/2011		$23.86	$15.42	$39.28
Drywall Finisher	5/1/2012		$25.11	$15.07	$40.18
Drywall Finisher	5/1/2013		$25.11	$16.22	$41.33
Drywall Finisher	5/1/2014		$26.51	$16.12	$42.63

PREVAILING WAGES PROJECT RATES

Building	Effective Date	Expiration Date	Hourly Rate	Fringe Benefits	Total
Electric Lineman	6/3/2013		$40.78	$18.31	$59.09
Electric Lineman	6/2/2014		$42.68	$19.35	$62.03
Electric Lineman	6/1/2015		$44.63	$19.88	$64.51
Electric Lineman	5/30/2016		$46.16	$20.29	$66.45
Electricians	9/1/2013		$33.62	$18.57	$52.19
Electricians	2/1/2014		$33.37	$18.81	$52.18
Electricians	9/1/2014		$34.62	$18.86	$53.48
Elevator Constructor	1/1/2008		$37.85	$16.47	$54.32
Elevator Constructor	1/1/2010		$40.08	$20.24	$60.32
Elevator Constructor	1/1/2011		$41.33	$25.30	$66.63
Elevator Tender (Use Elevator Apprentice or Constructor)	1/1/2005		$0.00	$0.00	$0.00
Glazier	1/1/2012		$28.01	$14.38	$42.39
Glazier	5/1/2012		$28.01	$15.38	$43.39
Glazier	6/1/2013		$30.36	$15.33	$45.69
Glazier	5/1/2014		$32.26	$15.33	$47.59
Glazier	5/1/2015		$34.36	$15.33	$49.69
Iron Workers (Bridge, Structural Steel, Ornamental, Precast, Reinforcing)	7/1/2011		$29.50	$22.70	$52.20
Iron Workers (Bridge, Structural Steel, Ornamental, Precast, Reinforcing)	7/1/2012		$30.50	$22.70	$53.20
Iron Workers (Bridge, Structural Steel, Ornamental, Precast, Reinforcing)	7/1/2013		$31.75	$22.70	$54.45
Iron Workers (Bridge, Structural Steel, Ornamental, Precast, Reinforcing)	7/1/2014		$30.70	$25.25	$55.95
Laborers (Class 01 - See notes)	5/1/2009		$19.43	$9.73	$29.16
Laborers (Class 01 - See notes)	5/1/2010		$19.43	$11.43	$30.86
Laborers (Class 01 - See notes)	5/1/2011		$19.42	$12.14	$31.56
Laborers (Class 01 - See notes)	5/1/2012		$19.42	$12.64	$32.06
Laborers (Class 01 - See notes)	5/1/2013		$19.67	$13.09	$32.76
Laborers (Class 01 - See notes)	5/1/2014		$19.97	$13.74	$33.71
Laborers (Class 01 - See notes)	5/1/2015		$19.97	$14.69	$34.66
Laborers (Class 01 - See notes)	5/1/2016		$19.97	$15.59	$35.56
Laborers (Class 02 - See notes)	5/1/2011		$21.42	$12.14	$33.56
Laborers (Class 02 - See notes)	5/1/2012		$21.42	$12.64	$34.06

PREVAILING WAGES PROJECT RATES

Building	Effective Date	Expiration Date	Hourly Rate	Fringe Benefits	Total
Laborers (Class 02 - See notes)	5/1/2013		$21.67	$13.09	$34.76
Laborers (Class 02 - See notes)	5/1/2014		$21.97	$13.74	$35.71
Laborers (Class 02 - See notes)	5/1/2015		$21.97	$14.69	$36.66
Laborers (Class 02 - See notes)	5/1/2016		$21.97	$15.59	$37.56
Laborers (Class 03 - See notes)	5/1/2009		$23.43	$9.73	$33.16
Laborers (Class 03 - See notes)	5/1/2010		$23.43	$11.43	$34.86
Laborers (Class 03 - See notes)	5/1/2011		$22.72	$12.14	$34.86
Laborers (Class 03 - See notes)	5/1/2012		$22.72	$13.02	$35.74
Laborers (Class 03 - See notes)	5/1/2013		$23.22	$13.09	$36.31
Laborers (Class 03 - See notes)	5/1/2014		$23.52	$13.74	$37.26
Laborers (Class 03 - See notes)	5/1/2015		$23.52	$14.69	$38.21
Laborers (Class 03 - See notes)	5/1/2016		$23.52	$15.59	$39.11
Laborers (Class 04 - See notes)	5/1/2009		$24.93	$9.73	$34.66
Laborers (Class 04 - See notes)	5/1/2010		$24.93	$11.43	$36.36
Laborers (Class 04 - See notes)	5/1/2011		$24.22	$12.14	$36.36
Laborers (Class 04 - See notes)	5/1/2012		$24.22	$13.02	$37.24
Laborers (Class 04 - See notes)	5/1/2013		$24.72	$13.09	$37.81
Laborers (Class 04 - See notes)	5/1/2014		$25.02	$13.74	$38.76
Laborers (Class 04 - See notes)	5/1/2015		$25.02	$14.69	$39.71
Laborers (Class 04 - See notes)	5/1/2016		$25.02	$15.59	$40.61
Laborers (Class 05 - See notes)	5/3/2009		$25.43	$9.86	$35.29
Laborers (Class 05 - See notes)	5/1/2010		$25.43	$11.43	$36.86
Laborers (Class 05 - See notes)	5/1/2011		$24.72	$12.14	$36.86
Laborers (Class 05 - See notes)	5/1/2012		$24.72	$13.02	$37.74
Laborers (Class 05 - See notes)	5/1/2013		$25.22	$13.09	$38.31
Laborers (Class 05 - See notes)	5/1/2014		$25.52	$13.74	$39.26
Laborers (Class 05 - See notes)	5/1/2015		$25.52	$14.69	$40.21
Laborers (Class 05 - See notes)	5/1/2016		$25.52	$15.59	$41.11
Laborers (Class 06 - See notes)	5/1/2011		$20.77	$12.14	$32.91
Laborers (Class 06 - See notes)	5/1/2012		$20.77	$12.64	$33.41
Laborers (Class 06 - See notes)	5/1/2013		$21.02	$13.09	$34.11

PREVAILING WAGES PROJECT RATES

Building	Effective Date	Expiration Date	Hourly Rate	Fringe Benefits	Total
Laborers (Class 06 - See notes)	5/1/2014		$21.32	$13.74	$35.06
Laborers (Class 06 - See notes)	5/1/2015		$21.32	$14.69	$36.01
Laborers (Class 06 - See notes)	5/1/2016		$21.32	$15.59	$36.91
Millwright	5/1/2010		$28.91	$13.99	$42.90
Millwright	5/1/2011		$30.27	$14.63	$44.90
Millwright	5/1/2012		$31.14	$15.26	$46.40
Millwright	5/1/2013		$32.16	$15.74	$47.90
Millwright	5/1/2014		$33.17	$16.33	$49.50
Operators (Building/Heavy, Class 01 - See Notes)	5/1/2009		$29.42	$16.89	$46.31
Operators (Building/Heavy, Class 01 - See Notes)	5/1/2010		$30.76	$17.85	$48.61
Operators (Building/Heavy, Class 01 - See Notes)	5/1/2011		$32.06	$18.85	$50.91
Operators (Building/Heavy, Class 01 - See Notes)	5/1/2012		$32.06	$20.25	$52.31
Operators (Building/Heavy, Class 01 - See Notes)	5/1/2013		$32.06	$21.65	$53.71
Operators (Building/Heavy, Class 01 - See Notes)	5/1/2014		$32.70	$22.41	$55.11
Operators (Building/Heavy, Class 01a - See Notes)	5/1/2009		$31.67	$17.55	$49.22
Operators (Building/Heavy, Class 01a - See Notes)	5/1/2010		$33.01	$18.51	$51.52
Operators (Building/Heavy, Class 01a - See Notes)	5/1/2011		$34.31	$19.51	$53.82
Operators (Building/Heavy, Class 01a - See Notes)	5/1/2012		$34.31	$20.91	$55.22
Operators (Building/Heavy, Class 01a - See Notes)	5/1/2013		$34.31	$22.31	$56.62
Operators (Building/Heavy, Class 01a - See Notes)	5/1/2014		$34.95	$23.07	$58.02
Operators (Building/Heavy, Class 02 - See Notes)	5/1/2009		$29.13	$16.81	$45.94
Operators (Building/Heavy, Class 02 - See Notes)	5/1/2010		$30.47	$17.77	$48.24
Operators (Building/Heavy, Class 02 - See Notes)	5/1/2011		$31.77	$18.77	$50.54
Operators (Building/Heavy, Class 02 - See Notes)	5/1/2012		$31.77	$20.17	$51.94
Operators (Building/Heavy, Class 02 - See Notes)	5/1/2013		$31.77	$21.57	$53.34
Operators (Building/Heavy, Class 02 - See Notes)	5/1/2014		$32.41	$22.33	$54.74
Operators (Building/Heavy, Class 02a - See Notes)	5/1/2009		$31.38	$17.48	$48.86
Operators (Building/Heavy, Class 02a - See Notes)	5/1/2010		$32.72	$18.44	$51.16

PREVAILING WAGES PROJECT RATES

Building	Effective Date	Expiration Date	Hourly Rate	Fringe Benefits	Total
Operators (Building/Heavy, Class 02a - See Notes)	5/1/2011		$34.02	$19.44	$53.46
Operators (Building/Heavy, Class 02a - See Notes)	5/1/2012		$34.02	$20.84	$54.86
Operators (Building/Heavy, Class 02a - See Notes)	5/1/2013		$34.02	$22.24	$56.26
Operators (Building/Heavy, Class 02a - See Notes)	5/1/2014		$34.66	$23.00	$57.66
Operators (Building/Heavy, Class 03 - See Notes)	5/1/2009		$26.22	$15.94	$42.16
Operators (Building/Heavy, Class 03 - See Notes)	5/1/2010		$27.55	$16.91	$44.46
Operators (Building/Heavy, Class 03 - See Notes)	5/1/2011		$28.85	$17.91	$46.76
Operators (Building/Heavy, Class 03 - See Notes)	5/1/2012		$28.85	$19.31	$48.16
Operators (Building/Heavy, Class 03 - See Notes)	5/1/2013		$28.85	$20.71	$49.56
Operators (Building/Heavy, Class 03 - See Notes)	5/1/2014		$29.49	$21.47	$50.96
Operators (Building/Heavy, Class 04 - See Notes)	5/1/2009		$25.08	$15.61	$40.69
Operators (Building/Heavy, Class 04 - See Notes)	5/1/2010		$26.42	$16.57	$42.99
Operators (Building/Heavy, Class 04 - See Notes)	5/1/2011		$27.72	$17.57	$45.29
Operators (Building/Heavy, Class 04 - See Notes)	5/1/2012		$27.72	$18.97	$46.69
Operators (Building/Heavy, Class 04 - See Notes)	5/1/2013		$27.72	$20.37	$48.09
Operators (Building/Heavy, Class 04 - See Notes)	5/1/2014		$28.35	$21.14	$49.49
Operators (Building/Heavy, Class 05 - See Notes)	5/1/2009		$24.64	$15.47	$40.11
Operators (Building/Heavy, Class 05 - See Notes)	5/1/2010		$25.96	$16.45	$42.41
Operators (Building/Heavy, Class 05 - See Notes)	5/1/2011		$27.27	$17.44	$44.71
Operators (Building/Heavy, Class 05 - See Notes)	5/1/2012		$27.27	$18.84	$46.11
Operators (Building/Heavy, Class 05 - See Notes)	5/1/2013		$27.27	$20.24	$47.51
Operators (Building/Heavy, Class 05 - See Notes)	5/1/2014		$27.90	$21.01	$48.91
Operators (Building/Heavy, Class 06 - See Notes)	5/1/2009		$23.76	$15.21	$38.97
Operators (Building/Heavy, Class 06 - See Notes)	5/1/2010		$25.09	$16.18	$41.27
Operators (Building/Heavy, Class 06 - See Notes)	5/1/2011		$26.39	$17.18	$43.57
Operators (Building/Heavy, Class 06 - See Notes)	5/1/2012		$26.39	$18.58	$44.97

PREVAILING WAGES PROJECT RATES

Building	Effective Date	Expiration Date	Hourly Rate	Fringe Benefits	Total
Operators (Building/Heavy, Class 06 - See Notes)	5/1/2013		$26.39	$19.98	$46.37
Operators (Building/Heavy, Class 06 - See Notes)	5/1/2014		$27.02	$20.75	$47.77
Operators (Building/Heavy, Class 07/A - See Notes)	5/1/2009		$35.30	$19.38	$54.68
Operators (Building/Heavy, Class 07/A - See Notes)	5/1/2010		$36.91	$20.43	$57.34
Operators (Building/Heavy, Class 07/A - See Notes)	5/1/2011		$38.47	$21.53	$60.00
Operators (Building/Heavy, Class 07/A - See Notes)	5/1/2012		$38.47	$23.16	$61.63
Operators (Building/Heavy, Class 07/A - See Notes)	5/1/2013		$38.47	$24.79	$63.26
Operators (Building/Heavy, Class 07/A - See Notes)	5/1/2014		$39.24	$25.69	$64.93
Operators (Building/Heavy, Class 07/B - See Notes)	5/1/2009		$34.96	$19.27	$54.23
Operators (Building/Heavy, Class 07/B - See Notes)	5/1/2010		$36.56	$20.33	$56.89
Operators (Building/Heavy, Class 07/B - See Notes)	5/1/2011		$38.12	$21.43	$59.55
Operators (Building/Heavy, Class 07/B - See Notes)	5/1/2012		$38.12	$23.06	$61.18
Operators (Building/Heavy, Class 07/B - See Notes)	5/1/2013		$38.12	$24.69	$62.81
Operators (Building/Heavy, Class 07/B - See Notes)	5/1/2014		$38.89	$25.59	$64.48
Painters Class 1 (see notes)	5/1/2014		$25.95	$16.12	$42.07
Painters Class 2 (see notes)	5/1/2014		$27.95	$16.12	$44.07
Painters Class 3 (see notes)	5/1/2014		$32.25	$16.12	$48.37
Pile Driver Divers (Building, Heavy, Highway)	1/1/2009		$43.28	$12.00	$55.28
Pile Driver Divers (Building, Heavy, Highway)	1/1/2010		$44.39	$12.25	$56.64
Pile Driver Divers (Building, Heavy, Highway)	1/1/2010		$44.39	$12.25	$56.64
Pile Driver Divers (Building, Heavy, Highway)	1/1/2011		$45.53	$13.00	$58.53
Pile Driver Divers (Building, Heavy, Highway)	1/1/2012		$46.28	$13.60	$59.88
Pile Driver Divers (Building, Heavy, Highway)	1/1/2013		$47.18	$14.10	$61.28
Plasterers	5/1/2013		$23.03	$19.08	$42.11
Plasterers	5/1/2014		$23.48	$19.53	$43.01
Plumbers	5/1/2014		$39.15	$27.88	$67.03
Roofers (Composition)	5/1/2013		$31.05	$28.40	$59.45
Roofers (Composition)	5/1/2014		$32.15	$28.65	$60.80

PREVAILING WAGES PROJECT RATES

Building	Effective Date	Expiration Date	Hourly Rate	Fringe Benefits	Total
Roofers (Shingle, Slate, Tile)	5/1/2012		$24.00	$16.37	$40.37
Roofers (Shingle, Slate, Tile)	5/1/2014		$24.50	$17.37	$41.87
Sheet Metal Workers	6/1/2013		$31.58	$30.45	$62.03
Sheet Metal Workers	1/6/2014		$31.58	$30.95	$62.53
Sheet Metal Workers	6/1/2014		$32.55	$30.98	$63.53
Sign Makers and Hangars	7/1/2009		$24.17	$15.99	$40.16
Sign Makers and Hangars	5/21/2010		$24.33	$16.37	$40.70
Sprinklerfitters	1/1/2010		$33.85	$17.60	$51.45
Sprinklerfitters	1/1/2011		$33.35	$18.45	$51.80
Sprinklerfitters	4/1/2011		$34.18	$18.45	$52.63
Sprinklerfitters	1/1/2012		$34.18	$18.60	$52.78
Sprinklerfitters	4/1/2012		$35.21	$18.65	$53.86
Sprinklerfitters	1/1/2013		$35.21	$18.80	$54.01
Sprinklerfitters	4/1/2013		$33.03	$20.12	$53.15
Sprinklerfitters	7/1/2013		$33.69	$20.12	$53.81
Sprinklerfitters	4/1/2014		$34.36	$20.47	$54.83
Sprinklerfitters	4/1/2015		$35.05	$20.62	$55.67
Steamfitters	5/1/2013		$41.41	$27.83	$69.24
Steamfitters	5/1/2014		$42.71	$28.96	$71.67
Terrazzo Finisher	5/1/2013		$29.13	$14.58	$43.71
Terrazzo Finisher	5/1/2014		$29.47	$14.99	$44.46
Terrazzo Setter	5/1/2013		$28.39	$17.54	$45.93
Terrazzo Setter	5/1/2014		$28.67	$18.01	$46.68
Tile & Marble Finisher	5/1/2013		$24.62	$12.73	$37.35
Tile & Marble Finisher	5/1/2014		$24.91	$13.14	$38.05
Tile & Marble Finisher	5/1/2015		$25.55	$13.30	$38.85
Tile & Marble Finisher	5/1/2016		$26.19	$13.56	$39.75
Tile & Marble Layer	5/1/2011		$25.85	$13.86	$39.71
Tile & Marble Layer	5/1/2012		$26.85	$14.04	$40.89
Tile & Marble Layer	5/1/2013		$27.37	$14.12	$41.49
Tile & Marble Layer	5/1/2014		$27.75	$14.44	$42.19

PREVAILING WAGES PROJECT RATES

Building	Effective Date	Expiration Date	Hourly Rate	Fringe Benefits	Total
Tile & Marble Layer	5/1/2015		$28.48	$14.51	$42.99
Tile & Marble Layer	5/1/2016		$29.26	$14.63	$43.89
Truckdriver class 1(see notes)	5/1/2010		$29.58	$0.00	$29.58
Truckdriver class 1(see notes)	5/1/2011		$30.73	$0.00	$30.73
Truckdriver class 1(see notes)	5/1/2012		$30.98	$0.00	$30.98
Truckdriver class 2 (see notes)	5/1/2010		$29.65	$0.00	$29.65
Truckdriver class 2 (see notes)	5/1/2011		$30.80	$0.00	$30.80
Truckdriver class 2 (see notes)	5/1/2012		$31.05	$0.00	$31.05
Truckdriver class 3 (see notes)	5/1/2010		$30.14	$0.00	$30.14
Truckdriver class 3 (see notes)	5/1/2011		$31.29	$0.00	$31.29
Truckdriver class 3 (see notes)	5/1/2012		$31.54	$0.00	$31.54

PREVAILING WAGES PROJECT RATES

Heavy/Highway	Effective Date	Expiration Date	Hourly Rate	Fringe Benefits	Total
Carpenters	5/1/2009		$25.30	$9.86	$35.16
Carpenters	5/1/2010		$25.98	$10.83	$36.81
Carpenters	5/1/2011		$27.03	$11.43	$38.46
Carpenters	5/1/2012		$27.18	$12.38	$39.56
Carpenters	5/1/2013		$27.92	$12.84	$40.76
Carpenters	5/1/2014		$28.72	$13.24	$41.96
Laborers (Class 01 - See notes)	5/1/2013		$18.16	$14.04	$32.20
Laborers (Class 01 - See notes)	5/1/2014		$18.66	$14.69	$33.35
Laborers (Class 01 - See notes)	5/1/2015		$19.21	$15.34	$34.55
Laborers (Class 02 - See notes)	5/1/2009		$22.84	$11.03	$33.87
Laborers (Class 02 - See notes)	5/1/2010		$23.39	$11.88	$35.27
Laborers (Class 02 - See notes)	5/1/2011		$23.94	$12.78	$36.72
Laborers (Class 02 - See notes)	5/1/2012		$24.33	$13.39	$37.72
Laborers (Class 02 - See notes)	5/1/2013		$24.78	$14.04	$38.82
Laborers (Class 02 - See notes)	5/1/2014		$25.28	$14.69	$39.97
Laborers (Class 02 - See notes)	5/1/2015		$25.83	$15.34	$41.17
Laborers (Class 03 - See notes)	5/1/2010		$20.38	$11.88	$32.26
Laborers (Class 03 - See notes)	5/1/2011		$20.93	$12.78	$33.71
Laborers (Class 03 - See notes)	5/1/2012		$21.32	$13.39	$34.71
Laborers (Class 03 - See notes)	5/1/2013		$21.77	$14.04	$35.81
Laborers (Class 03 - See notes)	5/1/2014		$22.27	$14.69	$36.96
Laborers (Class 03 - See notes)	5/1/2015		$22.82	$15.34	$38.16
Laborers (Class 04 - See notes)	5/1/2009		$20.18	$11.03	$31.21
Laborers (Class 04 - See notes)	5/1/2010		$20.73	$11.88	$32.61
Laborers (Class 04 - See notes)	5/1/2011		$21.28	$12.78	$34.06
Laborers (Class 04 - See notes)	5/1/2012		$21.67	$13.39	$35.06
Laborers (Class 04 - See notes)	5/1/2013		$22.12	$14.04	$36.16
Laborers (Class 04 - See notes)	5/1/2014		$22.62	$14.69	$37.31
Laborers (Class 04 - See notes)	5/1/2015		$23.17	$15.34	$38.51
Laborers (Class 05 - See notes)	5/1/2009		$20.85	$11.03	$31.88
Laborers (Class 05 - See notes)	5/1/2010		$21.40	$11.88	$33.28

PREVAILING WAGES PROJECT RATES

Heavy/Highway	Effective Date	Expiration Date	Hourly Rate	Fringe Benefits	Total
Laborers (Class 05 - See notes)	5/1/2011		$21.95	$12.78	$34.73
Laborers (Class 05 - See notes)	5/1/2012		$22.34	$13.39	$35.73
Laborers (Class 05 - See notes)	5/1/2013		$22.79	$14.04	$36.83
Laborers (Class 05 - See notes)	5/1/2014		$23.29	$14.69	$37.98
Laborers (Class 05 - See notes)	5/1/2015		$23.84	$15.34	$39.18
Laborers (Class 06 - See notes)	5/1/2009		$20.27	$11.03	$31.30
Laborers (Class 06 - See notes)	5/1/2010		$20.82	$11.88	$32.70
Laborers (Class 06 - See notes)	5/1/2011		$21.37	$12.78	$34.15
Laborers (Class 06 - See notes)	5/1/2012		$21.76	$13.39	$35.15
Laborers (Class 06 - See notes)	5/1/2013		$22.21	$14.04	$36.25
Laborers (Class 06 - See notes)	5/1/2014		$22.71	$14.69	$37.40
Laborers (Class 06 - See notes)	5/1/2015		$23.26	$15.34	$38.60
Laborers (Class 07 - See notes)	5/1/2009		$20.56	$11.03	$31.59
Laborers (Class 07 - See notes)	5/1/2010		$21.11	$11.88	$32.99
Laborers (Class 07 - See notes)	5/1/2011		$21.66	$12.78	$34.44
Laborers (Class 07 - See notes)	5/1/2012		$22.05	$13.39	$35.44
Laborers (Class 07 - See notes)	5/1/2013		$22.50	$14.04	$36.54
Laborers (Class 07 - See notes)	5/1/2014		$23.00	$14.69	$37.69
Laborers (Class 07 - See notes)	5/1/2015		$23.55	$15.34	$38.89
Laborers (Class 08 - See notes)	5/1/2009		$21.04	$11.03	$32.07
Laborers (Class 08 - See notes)	5/1/2010		$21.59	$11.88	$33.47
Laborers (Class 08 - See notes)	5/1/2011		$22.14	$12.78	$34.92
Laborers (Class 08 - See notes)	5/1/2012		$22.53	$13.39	$35.92
Laborers (Class 08 - See notes)	5/1/2013		$22.98	$14.04	$37.02
Laborers (Class 08 - See notes)	5/1/2014		$23.48	$14.69	$38.17
Laborers (Class 08 - See notes)	5/1/2015		$24.03	$15.34	$39.37
Operators (Highway, Class 01 - See Notes)	5/1/2010		$28.79	$17.26	$46.05
Operators (Highway, Class 01 - See Notes)	5/1/2011		$30.09	$18.26	$48.35
Operators (Highway, Class 01 - See Notes)	5/1/2012		$30.09	$19.51	$49.60
Operators (Highway, Class 01 - See Notes)	5/1/2013		$30.09	$20.76	$50.85

PREVAILING WAGES PROJECT RATES

Heavy/Highway	Effective Date	Expiration Date	Hourly Rate	Fringe Benefits	Total
Operators (Highway, Class 01 - See Notes)	5/1/2014		$30.38	$21.72	$52.10
Operators (Highway, Class 01a - See Notes)	5/1/2010		$31.04	$17.94	$48.98
Operators (Highway, Class 01a - See Notes)	5/1/2011		$32.34	$18.94	$51.28
Operators (Highway, Class 01a - See Notes)	5/1/2012		$32.34	$20.19	$52.53
Operators (Highway, Class 01a - See Notes)	5/1/2013		$32.34	$21.44	$53.78
Operators (Highway, Class 01a - See Notes)	5/1/2014		$32.63	$22.40	$55.03
Operators (Highway, Class 02 - See Notes)	5/1/2010		$27.61	$16.92	$44.53
Operators (Highway, Class 02 - See Notes)	5/1/2011		$28.91	$17.92	$46.83
Operators (Highway, Class 02 - See Notes)	5/1/2012		$28.91	$19.17	$48.08
Operators (Highway, Class 02 - See Notes)	5/1/2013		$28.91	$20.42	$49.33
Operators (Highway, Class 02 - See Notes)	5/1/2014		$29.21	$21.37	$50.58
Operators (Highway, Class 03 - See Notes)	5/1/2010		$26.91	$16.72	$43.63
Operators (Highway, Class 03 - See Notes)	5/1/2011		$28.21	$17.72	$45.93
Operators (Highway, Class 03 - See Notes)	5/1/2012		$28.21	$18.97	$47.18
Operators (Highway, Class 03 - See Notes)	5/1/2013		$28.21	$20.22	$48.43
Operators (Highway, Class 03 - See Notes)	5/1/2014		$28.50	$21.18	$49.68
Operators (Highway, Class 04 - See Notes)	5/1/2010		$26.46	$16.59	$43.05
Operators (Highway, Class 04 - See Notes)	5/1/2011		$27.76	$17.59	$45.35
Operators (Highway, Class 04 - See Notes)	5/1/2012		$27.75	$18.85	$46.60
Operators (Highway, Class 04 - See Notes)	5/1/2013		$27.75	$20.10	$47.85
Operators (Highway, Class 04 - See Notes)	5/1/2014		$28.05	$21.05	$49.10
Operators (Highway, Class 05 - See Notes)	5/1/2010		$25.95	$16.44	$42.39
Operators (Highway, Class 05 - See Notes)	5/1/2011		$27.25	$17.44	$44.69
Operators (Highway, Class 05 - See Notes)	5/1/2012		$27.25	$18.69	$45.94
Operators (Highway, Class 05 - See Notes)	5/1/2013		$27.25	$19.94	$47.19
Operators (Highway, Class 05 - See Notes)	5/1/2014		$27.54	$20.90	$48.44

PREVAILING WAGES PROJECT RATES

Heavy/Highway	Effective Date	Expiration Date	Hourly Rate	Fringe Benefits	Total
Operators (Highway, Class 06 - See Notes)	5/1/2010		$29.03	$17.32	$46.35
Operators (Highway, Class 06 - See Notes)	5/1/2011		$30.33	$18.32	$48.65
Operators (Highway, Class 06 - See Notes)	5/1/2012		$30.33	$19.57	$49.90
Operators (Highway, Class 06 - See Notes)	5/1/2013		$30.33	$20.82	$51.15
Operators (Highway, Class 06 - See Notes)	5/1/2014		$30.62	$21.78	$52.40
Operators (Highway, Class 06/A - See Notes)	5/1/2010		$31.28	$17.98	$49.26
Operators (Highway, Class 06/A - See Notes)	5/1/2011		$32.58	$18.98	$51.56
Operators (Highway, Class 06/A - See Notes)	5/1/2012		$32.59	$20.23	$52.82
Operators (Highway, Class 06/A - See Notes)	5/1/2013		$32.58	$21.48	$54.06
Operators (Highway, Class 06/A - See Notes)	5/1/2014		$32.87	$22.44	$55.31
Operators (Highway, Class 07/A - See Notes)	5/1/2010		$34.55	$19.72	$54.27
Operators (Highway, Class 07/A - See Notes)	5/1/2011		$36.10	$20.83	$56.93
Operators (Highway, Class 07/A - See Notes)	5/1/2012		$36.10	$22.28	$58.38
Operators (Highway, Class 07/A - See Notes)	5/1/2013		$36.10	$23.73	$59.83
Operators (Highway, Class 07/A - See Notes)	5/1/2014		$36.45	$24.88	$61.33
Operators (Highway, Class 07/B - See Notes)	5/1/2010		$33.13	$19.31	$52.44
Operators (Highway, Class 07/B - See Notes)	5/1/2011		$34.69	$20.41	$55.10
Operators (Highway, Class 07/B - See Notes)	5/1/2012		$34.69	$21.86	$56.55
Operators (Highway, Class 07/B - See Notes)	5/1/2013		$34.69	$23.31	$58.00
Operators (Highway, Class 07/B - See Notes)	5/1/2014		$35.04	$24.46	$59.50
Piledrivers	5/1/2010		$25.98	$10.83	$36.81
Piledrivers	5/1/2011		$27.03	$11.43	$38.46
Steamfitters (Heavy and Highway - Gas Distribution)	5/1/2006		$27.01	$22.48	$49.49
Steamfitters (Heavy and Highway - Gas Distribution)	5/1/2010		$30.27	$26.09	$56.36
Steamfitters (Heavy and Highway - Gas Distribution)	5/1/2012		$34.87	$26.86	$61.73
Steamfitters (Heavy and Highway - Gas Distribution)	5/1/2013		$36.02	$27.73	$63.75
Steamfitters (Heavy and Highway - Gas Distribution)	5/1/2014		$37.19	$28.83	$66.02

PREVAILING WAGES PROJECT RATES

Heavy/Highway	Effective Date	Expiration Date	Hourly Rate	Fringe Benefits	Total
Truckdriver class 1(see notes)	5/1/2010		$29.58	$0.00	$29.58
Truckdriver class 1(see notes)	5/1/2011		$30.73	$0.00	$30.73
Truckdriver class 1(see notes)	5/1/2012		$30.98	$0.00	$30.98
Truckdriver class 2 (see notes)	5/1/2010		$29.65	$0.00	$29.65
Truckdriver class 2 (see notes)	5/1/2011		$30.80	$0.00	$30.80
Truckdriver class 2 (see notes)	5/1/2012		$31.05	$0.00	$31.05
Truckdriver class 3 (see notes)	5/1/2010		$30.14	$0.00	$30.14
Truckdriver class 3 (see notes)	5/1/2011		$31.29	$0.00	$31.29
Truckdriver class 3 (see notes)	5/1/2012		$31.05	$0.00	$31.05

Notes:
If you can not find a classification under Heavy/Highway please refer to the Building classifications.

The Bureau of Labor Law Compliance updated its Pennsylvania Building Journeyperson Laborer Notes to clarify existing tasks performed throughout the Commonwealth. The "Building Laborer Notes" link on the Bureau's website provides a list of those tasks that should be read in conformity with custom and usage of the construction industry in the geographic region in which they are utilized.

For further information on construction types review the "Notes as Referenced in Predeterminations" on the Labor and Industry Website. Go to www.dli.state.pa.us, scroll down to the picture labeled "Labor Law Compliance" and click the picture. Then scroll down on the left menu and click on the "Prevailing Wage" link.

PRICE BREAKDOWN

(TO BE SUBMITTED WITH BID)

CITY OF READING
READING, PA 19601

Bid Form - WYOMISSING PARK STREET LIGHTING REPLACEMENT

August 2014

We the undersigned agree to provide materials/equipment and service in accordance to "Request for Bids, **WYOMISSING PARK STREET LIGHTING REPLACEMENT**, dated August 2014, to the City of Reading, Reading, Pennsylvania, at the prices shown on this bid form.

This bid is subject to all terms of this request for bid, and we hereby agree to furnish the services as may be awarded to us, and to furnish such security, as this request for bid require.

We also certify that we have read the "Request for Bid" and offer to furnish all services as specified to the City of Reading in exact accordance with the "Request for Bids".

Circuit 1

ITEM	QUANTITY	UNIT OF MEASURE	UNIT PRICE	CALCULATED TOTAL
LUMINAIRE	28	EACH	$	$
POLE – REFURBISH	19	EACH	$	$
POLE – NEW	9	EACH	$	$
POLE FOUNDATION	28	EACH	$	$
1" CONDUIT	4,630	LF	$	$
3#8 WIRE, #10G, TERMINATIONS	9,645	LF	$	$
PULLBOX	11	EACH	$	$
ROAD CROSSING (INCLUDE CND) - EXCAVATION AND RESTORATION	545	LF	$	$
SIDEWALK / DRIVEWAY CROSSING (INCLUDE CND) - AUGER/BORING UNDER SIDEWALK / DRIVEWAY	270	LF	$	$
SERVICE ENTRANCE WORK	1	EACH	$	$
TOTAL CALCULATED COST FOR CIRCUIT 1				$

Alternate Bids

ITEM	QUANTITY	UNIT OF MEASURE	UNIT PRICE	CALCULATED TOTAL
DIRECT BURIED BRANCH CIRCUIT IN LIEU OF WIRE/CONDUIT	9,645	LF	$	$
ROAD CROSSING (INCLUDE CND) – AUGER/BORING UNDER ROAD	545	LF	$	$
SIDEWALK / DRIVEWAY CROSSING (INCLUDE CND) - EXCAVATION AND RESTORATION	270	LF	$	$

Signature _____
Title _____ Company Name _____

Circuit 2

ITEM	QUANTITY	UNIT OF MEASURE	UNIT PRICE	CALCULATED TOTAL
LUMINAIRE	22	EACH	$	$
POLE – REFURBISH	20	EACH	$	$
POLE – NEW	2	EACH	$	$
POLE FOUNDATION	22	EACH	$	$
1" CONDUIT	4,325	LF	$	$
3#8 WIRE, #10G, TERMINATIONS	5,730	LF	$	$
PULLBOX	9	EACH	$	$
ROAD CROSSING (INCLUDE CND) - EXCAVATION AND RESTORATION	290	LF	$	$
SIDEWALK / DRIVEWAY CROSSING (INCLUDE CND) - AUGER/BORING UNDER SIDEWALK / DRIVEWAY	350	LF	$	$
SERVICE ENTRANCE WORK	1	EACH	$	$
TOTAL CALCULATED COST FOR CIRCUIT 2				$

Alternate Bids

ITEM	QUANTITY	UNIT OF MEASURE	UNIT PRICE	CALCULATED TOTAL
DIRECT BURIED BRANCH CIRCUIT IN LIEU OF WIRE/CONDUIT	5,730	LF	$	$
ROAD CROSSING (INCLUDE CND) – AUGER/BORING UNDER ROAD	290	LF	$	$
SIDEWALK / DRIVEWAY CROSSING (INCLUDE CND) - EXCAVATION AND RESTORATION	350	LF	$	$

TOTAL CALCULATED COST (Circuit 1 and Circuit 2) - $_____

Acknowledgment of Addendum 1 _____ Acknowledgment of Addendum 2 _____

Signed this _____day of _____, 2014

Signature _____ Title _____

Company Name _____

Address _____

City _____ State _____ Zip _____

Phone No. (Area Code) _____ E-mail Address _____